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MECHANICAL ENGINEERING DEPARTMENT.

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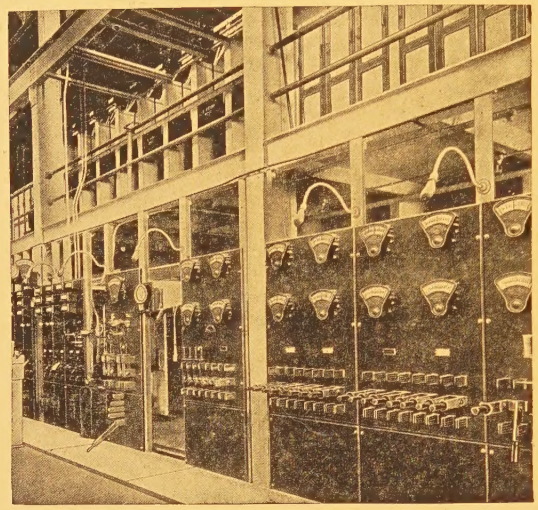

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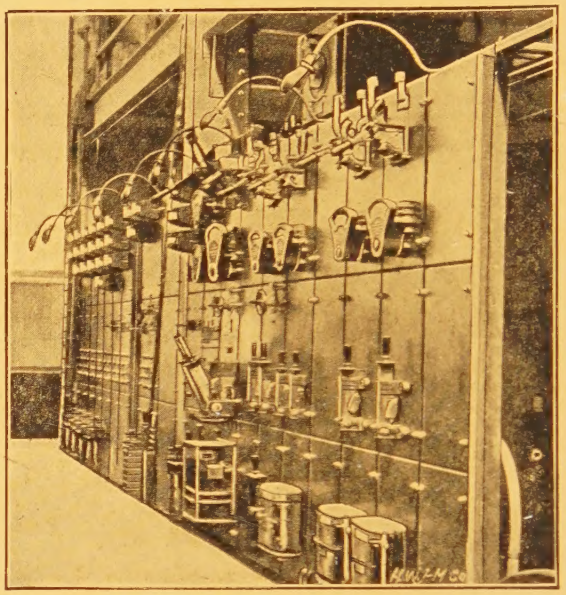

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Electric Railway Journal in 1911

Each year in the electric railway industry has brought its own problems. Sometimes they have been largely electrical or mechanical, in other years they have been legislative, in others financial. The proper time to analyze the conditions confronted by an industry during any period is of course at its close, but at present it seems as if in all phases of the work there was no time when a medium for collecting, disseminating and discussing the news of the field was more necessary. Acquaintance with the methods by which companies in other States and parts of the world are solving their problems should prove of more interest and value than ever before to every one engaged in electric railway work and should enable him either to apply those methods to his own particular problems or to improve upon them. It is the duty of the technical journal in any field to assist in this work by dealing in "ideas" as well as in "news." The purpose of the ELECTRIC RAILWAY JOURNAL is not only to give facts decisively, concisely and in an orderly manner but to present these facts in such a way as to stimulate the thought of the readers of the paper. This is the service which the ELECTRIC RAILWAY JOURNAL will aim to render to its readers during the coming year to a greater extent than ever before.

Our Statistical Number

For the past two years the ELECTRIC RAILWAY JOURNAL has published on the first Saturday of January carefully compiled statistics of the development of the electric railway industry during the preceding year. In doing so it has followed a custom inaugurated in 1907 by the ELECTRIC RAILWAY REVIEW, one of its constituent papers. The statistics this year, as in several previous years, include the miles of track built during the year, the number of cars ordered from independent manufacturers or built in companies' shops, a statement of the foreclosures and receiverships during the year, a review of the interurban railway construction in the Central States and other facts of general interest to the industry. This year these include a discussion of the trend of practice in car design, three important contributed articles on the electric railway development in Canada, Great Britain and Germany, and a series of signed articles on the work of the various electric railway associations contributed by the presidents of those associations. Our statistics show an addition of 5481 cars and about 1397 miles of track added by the electric railway companies during the year. We also print this year 10 editorial articles discussing the technical and financial status of the industry and a review of the business of the year. We take this occasion to express our sincere thanks to the companies which have assisted us in compiling the several tables published in this issue, and to the authors of the contributed articles for their illuminating discussions of the subjects treated by them.

MOTOR DESIGN AND CAR WEIGHTS

In the campaign to reduce the weight of cars, particularly those used in city service, attention was naturally directed first to the economies possible in the car body and its parts. Comparatively little thought was given to the question of the weight of the motor equipments except for the saving made through lightening the car body and thus lessening the size of the motors or the number required. But such a large factor in the total weight of a car as the motors could not long escape consideration, and manufacturers and users, both at home and abroad, have recently been applying their best efforts to a study of this subject.

Probably two-thirds of the total amount of work done by the motor equipment of a city car on level track is performed in accelerating the car, and the energy required for acceleration is directly proportional to the weight of the loaded car. The rest of the work done by the motors, or about one-third, is expended in overcoming the rolling friction of the car and the bearing and gear friction of the car and its equipment. From this it follows that a reduction in the total weight of a car effects a nearly proportional reduction in both maximum and average current demand, and also that it reduces, in the same approximate ratio, the capacity and consequently the interest charges on the entire electrical equipment of the road, from the motor, through the distribution system, to the power station itself. The total investment in the equipment thus affected is several times greater per car operated than the investment in the car bodies and trucks. Hence considerably more expense in car maintenance is permissible in a light car than in a heavy car before the sum of the interest account and the maintenance account of the road using a light equipment is equal to that of the same accounts of the road using a heavy equipment.

The most important change in railway motor design during the past decade has been the introduction of the commutating-pole motor. This change has not been accompanied by any direct reduction in weight or cost of motor, but it has resulted in an elimination of commutator troubles, so that heating is now practically the only consideration in the selection of a motor for a specified service. This fact has a relation to the problem we are considering in two ways. In the first place, the excellent commutation of the commutating-pole motor not only insures a long life of commutator and brushes, but its general cleanliness reduces insulation failures. Consequently the use of the commutating-pole motor has largely reduced the motor maintenance expense account, which has already been shown to be very closely, although indirectly, associated with the question of motor weight.

In the second place, with heating as the determining factor in motor selection, it was inevitable that more attention should be given to the subject of ventilation. Experiments with forced ventilation have demonstrated its advantages and have led to its application in locomotive service. It has even been found that the removal of the hand-hole covers on car motors is followed by a marked decrease in their temperature rise over that experienced when the motors are sealed. Here, then, is an important direct means of reducing motor weight, made possible by the introduction of the commutating-pole motor.

The forced ventilation of car motors has not yet been commercially developed, and there are undoubtedly difficulties in the way of conveying clean outside air free from brake-shoe dust and wheel-wash to the motor. But some practicable method will undoubtedly be found. Probably the complication and expense of separate motor-driven blowers are hardly justified with small city equipments, but their use on interurban equipments is among the early possibilities. Considerable benefit might even be secured with armature-driven fans if proper provision could be made for a clean air supply.

Another direction in which we can look for improvements in motor design within the near future is in the way of improved insulation. If a motor is continually operated at a temperature much exceeding the boiling point of water, the fabric insulation generally used in the armature and field coils rapidly deteriorates. Of course more latitude can be allowed in the deterioration of insulation in railway motors operated at low voltage than in high-voltage apparatus. Nevertheless, the heat limits of insulation have to be considered very seriously even in the design of railway motors. The need of the hour, therefore, so far as this matter is concerned, is for some improved form of insulation, having, perhaps, a better heat-conducting ability, but certainly better able to withstand higher temperatures than the insulations now usually used in apparatus of this kind. A commutating-pole motor whose windings were thus insulated and which was provided with some method of artificial ventilation would be materially lighter than motors now in general use.

A third possible means of weight reduction involves a somewhat more radical change in practice. In previous issues of this paper we have referred to the use in Germany of aluminum instead of copper for field windings. The Hamburg Street Railway, one of the largest roads in Germany, was the pioneer among the large roads abroad in the use of aluminum field coils and now has some 500 cars equipped with this type of coil. With its use the weight of a 40-hp motor has been reduced about 100 lb. without developing apparently any electrical or mechanical objections. With motors of larger capacity the saving in weight would be considerably more.

A fourth means of weight reduction lies in an increase of armature speed. This in a sense seems like a step backward. The early motors ran at high speed and practically all of those built before 1890 were equipped with double-reduction gearing because of this reason. The modern slow-speed motor was made possible by an increase in the number of poles and was a radical improvement over the earlier type. But the weight of a motor, other things being equal, varies in almost inverse proportion with its speed, so that there is a great inducement from a weight standpoint toward increasing the speed. The principal objections to a high-speed motor are the danger of bursting the binding bands and danger of trouble with the armature bearings. The latter consideration is the more important. It is doubtful whether there is much opportunity for improvement in the way of higher speeds, although there may be some in the case of motors used exclusively in frequent-stop city service. In such motors the armature reaches its maximum speed for short periods only and the average armature speed is usually moderate. A moderate increase in speed also would probably not give rise to any serious problems as regards either gears or brushes. Both of these motor parts have been materially improved within recent years, especially gears, which now are made of very high-grade steel when an exceptionally good article is required.

The comments which we have made on the present status and possibilities for future improvement of railway motors apply principally to motors used in city service, because the improvements discussed have been suggested largely by the desire to reduce car weights, which is particularly a city railway problem. The duty of motors in interurban service, where the stops are infrequent and where the question of acceleration is not so important, consists principally in overcoming wind, journal and track resistance. Here the weight of the cars is a secondary consideration. The use of commutating-pole motors and of artificial ventilation, however, is equally advantageous for this class of service, as they offer the means of obtaining an equipment of higher efficiency than that given by many motors in operation. The qualifications of motors for interurban service should be perfect commutation, low armature speed, low core loss and moderate cost.

CAR BUILDING IN 1910

The statistics of cars ordered during 1910, which are printed elsewhere in this issue, indicate that the electric railway car-building industry enjoyed a prosperous year. The total number of cars ordered was only slightly less than in 1907 and was more than twice the number ordered in 1908. The figures for 1909 were exceeded by 735 cars, the increase being represented principally in cars for city service. Some exceptionally large single orders for cars were placed. Among them may be mentioned 300 cars for the Los Angeles Railway and 150 cars for the Capital Traction Company of Washington, D. C. Nearly all of the Pacific Coast roads made large additions to their rolling stock equipment, the orders of six companies aggregating 745 passenger cars. The Canadian car builders also received some large orders.

Closed cars are still being built in the largest numbers for city service, although the semi-convertible car is coming more and more into use as a general service car for both summer and winter service. A few years ago street railways operated nearly as many open cars as closed cars, changing the trucks and electrical equipment every spring and fall. The cost of doing this work and the extra storage space required for the cars out of service outweigh any advantage of the open car from a traffic standpoint and the practice is being discontinued by many companies. Only 326 open cars were ordered this year, as against 3245 closed, semi-convertible and convertible cars.

The prepayment method of fare collection was introduced in the United States only three years ago, but its many advantages have led to its rapid adoption in small as well as large cities in all parts of the country. Last year 1096 out of 2537 city cars ordered were of the prepayment type, while this year 1878 prepayment cars were ordered out of a total of 3571 city cars. Large numbers of old cars have been remodeled for prepayment operation. Boston and San Francisco are the latest cities of large size to adopt this system for new cars. An interesting development of the year was the one-man pay-as-you-enter car for small roads. Several cars of this type were built for use in Southern cities. Passengers enter and leave by the front platform under the inspection of the motorman. No difficulty has been experienced in adapting the prepayment method in the South to "Jim Crow" cars, in which the white and colored passengers are segregated.

The growth of heavy freight traffic on the interurban roads in the Western States has made necessary the purchase of a large number of new and second-hand box, flat and gondola cars of standard steam railroad types. As the number of these cars placed in service increases it will become more imperative to standardize the couplers and draft gear of all cars so that mixed trains can be operated. For train operation it is equally important to standardize the location of brake hose and train line jumper sockets. Last fall two disastrous head-on collisions between interurban cars demonstrated the necessity of building and maintaining all passenger car bodies at the same height above the rails so as to prevent as far as possible over-riding of one car on the other.

A few self-propelled gas-motor and storage-battery cars were designed and built during 1910. For new interurban roads with light traffic the gas-motor car enables operation to be begun before the earnings would pay the interest on the investment in overhead line and a power house. These cars are being constructed in sizes up to 70 ft. long. Marked improvements in storage batteries for vehicular service have again called attention to this type of self-propelled car for lines of light traffic. The high rate of acceleration required in a street car making frequent stops heretofore has been the principal cause of the failure of storage-battery cars owing to the deterioration of the batteries when discharged too rapidly. To reduce the load on the battery during the acceleration period as much as possible the storage-battery cars which have been tried in New York City and elsewhere have been built with bodies and trucks of exceptionally low weight and they have been fitted throughout with anti-friction bearings. As a result, the power consumption has been reduced to approximately 45 watt-hours per ton-mile as compared with about 140 watt-hours per ton-mile for an ordinary trolley car.

The storage-battery cars now in service and many of the detail improvements which have contributed to their successful operation are still in the experimental stage, but they have pointed the way toward possible methods for reducing the weight and power consumption of all types of cars for city service. The tests made in Philadelphia with anti-friction motor and journal bearings demonstrated the saving in power consumption made by using these devices, and it only remains to determine their life in actual service under the usual conditions of inspection and maintenance.

The demand for better ventilation and heating of city cars has been met by a number of new systems and devices which are being widely used. In addition to improvements in automatic deck sash ventilators, forced-draft and exhaust-fan systems have been perfected which create a positive movement of fresh air through the car at all times. The Chicago Health Department, through its comprehensive experiments with car ventilation systems, has contributed many valuable experimental data on the requirements of heating and ventilating apparatus and has given a new impetus to improvements in this direction. Briefly, the ordinances in Chicago now require that not less than 400 cu. ft. of fresh air per passenger per hour should be introduced over heaters near the floor line and exhausted near the ceiling.

For high-speed service the M. C. B. equalized type of truck has been found superior to any other, and the slight modifications of the different truck builders consist chiefly in details of frame construction, brake rigging and other parts which do

not affect the riding qualities. In the most recent designs of trucks particular attention has been paid to maintaining the alignment of the frames and provision for wear of the moving parts, such as the pedestal jaws and bolsters. It is worthy of note that the standard axle and journal boxes of the American Electric Railway Engineering Association are being used on nearly all new cars. Solid steel wheels have come into favor rapidly, and many of the largest city and interurban railways are using them exclusively. Much better cast-iron wheels can now be bought than ever before at a price based on mileage which compares favorably with that of steel wheels. Cast-steel wheels also are being sold in competition with cast-iron and rolled-steel wheels, and their mileage records are said to be excellent.

ELECTRIC LOCOMOTIVE DESIGN

One of the most important as well as the most generally heralded advantages of electricity over steam as a motive power for railway service is the economy with which the power can be subdivided. This permits the economical operation of a large number of single car units and allows a large number of the axles of a train to be made driving axles. Nevertheless, it is noteworthy that the two principal installations made during the past year in this country of heavy electric traction equipment, that of the Pennsylvania Tunnel & Terminal Company and that of the Detroit River Tunnel, are exclusively locomotive, and that the most important installation of this character now under construction in this country, that of the Hoosac Tunnel, is also exclusively locomotive. In these instances it was what might be called a subsidiary advantage of electricity that led to its adoption, but this condition emphasizes the fact that electric locomotive design will continue for some time at least to constitute an important part of electric railway engineering.

When the subject is more closely considered it will be found that the limitations of space and weight on an electric locomotive have given rise to a wide variety of principles of design. Indeed, in the five principal heavy electric traction installations recently made the locomotives represent as many different types. Thus we have the New York Central d.c. gearless, the New Haven a.c. quill-mounted gearless, the Pennsylvania d.c. side-rod gearless, the Detroit Tunnel d.c. horizontally supported motor type with twin gearing, represented also by the latest B. & O. locomotives, and the Hoosac Tunnel locomotive with geared and vertically supported motors. While successful operation is obtained with all five designs, it would be most interesting to compare the cost of upkeep of five such dissimilar constructions. The two gearless locomotives have now been in successful operation for such length of time as to make such figures of value.

The small locomotives first built naturally used the general type of motors and methods of suspension employed in street railway service. About 1893 and 1894, following the efforts made to design a gearless motor for street railways, several gearless electric locomotives were built, notably for the Baltimore & Ohio Belt Line and for the Central London Underground Railroad. But there was a reaction in favor of the geared and horizontally suspended motor for slow-speed work until the motor capacity required exceeded the permissible duty which could be placed upon a single pinion. This introduced the twin-gear construction of the Great Northern Railroad and subsequently those of the Detroit Tunnel and latest B. & O. locomotives. In these machines the limit of standard axle motor design with horizontal suspension seems to be reached. These locomotives, however, provide about all the capacity which is required by a single-unit freight locomotive, operating at speeds of from 15 m.p.h. to 20 m.p.h., and two such units can supply a drawbar pull in excess of the strength of the usual draft gear. Where such locomotives are used exclusively for freight service this type of construction is fairly satisfactory in first cost, operation and maintenance.

For high-speed passenger service a departure from the street railway, or horizontal, geared type of motor appears necessary. This is partly because the space available is not sufficient for the very much larger capacity of motors required and partly because of the necessity of providing better running qualities than those afforded by an ordinary heavy bogie truck. In this connection experience seems to indicate that a leading guiding truck is desirable for high-speed locomotives, four wheels being preferable to two. There is a wide divergence, however, in the designs of the motors used on high-speed electric locomotives and in the method of transmitting their torque to the driving wheels.

Omitting from consideration the early gearless motors of 15 years ago, which were supported directly on the axle, the first attempt to solve this problem of high speed and large capacity was the direct-current locomotive of the New York Central Railroad. These locomotives have proved reliable and highly efficient in operation and capable of much higher voltages than the 650 volts used on the New York Central road. The lower speed limit of this type of construction has not yet been fully determined, but the simplicity of the design makes it particularly attractive for direct-current freight or passenger service, provided the speed is not so low as to make the first cost prohibitive.

Side-rod locomotives have found considerable favor abroad, but will be an untried venture in this country until the operation of the Pennsylvania locomotives shall have established their status. With the entire weight of motors spring-supported and equipped with guiding trucks, the side-rod construction provides for easy riding qualities, but the dual relations of efficiency and weight of locomotives of this type, as compared with the efficiency and weight of the high-speed gearless locomotives of either the New York Central or the New Haven types, are not yet known. The high center of gravity and the inside journals of the side-rod locomotive are patterned after steam engine practice, and it is expected that track inequalities will cause a rolling movement in this locomotive, rather than undesirable nosing. Finally, even when full advantage is taken of the better ventilation of the more open construction, made possible in the Pennsylvania locomotive by housing the motor in the superstructure and fully protecting it from climatic conditions, it would still seem that the direct side-rod construction is necessarily heavy and expensive, owing to the low rotative speed of the armature. Still a further step would be the introduction of gearing as well as side rods. While this might appear an undesirable added complication, it undoubtedly would result in producing a lighter structure by reason of the higher armature speed thus afforded, and it is probable that the combination of gear and side-rod drive will become a factor in future electric locomotive design, both for high-speed passenger

SEMINARY ROOM, MECHANICAL ENGINEERING DEPARTMENT.

and lower-speed freight service. Locomotives of this type, built abroad, have been described in the pages of the ELECTRIC RAILWAY JOURNAL during the past year.

The design of electric locomotives in which a geared motor is supported directly above the axle had its origin in the desire to retain the high-speed advantages of the ordinary geared motor but to be free of the space limitations which exist when a geared motor is carried horizontally between the axles. The equipment of the Hoosac Tunnel with this type of locomotives, and their operation, will add very much to our knowledge of the practical advantages of this plan.

From the standpoint of service, electric locomotives can be divided into three general classes: high-speed passenger, low-speed freight and switching locomotives. The multiple-unit control is valuable in all three as it provides for double heading, as required by service conditions. In many instances it would be a great operating advantage if a locomotive could be so designed as to be used interchangeably for both passenger and freight service. In the case of electric locomotives designed to operate exclusively on heavy mountain grades interchangeability can possibly be secured without too great a penalty in weight and first cost of the all-around unit. For level track operation, however, it is probable that two distinct types of locomotives will better serve the dissimilar requirements mentioned.

The experience gained with steam engines should, of course, count for much in the design of electric locomotives. A distinction should be made, however, between the features employed in the steam locomotive because of the requirements of the steam equipment and those dictated by the hauling and riding qualities of the locomotive. Experience based on the latter considerations is limited, owing to the ruling necessity of making proper provision for the boiler and firebox. A removal of the handicap in a locomotive of providing a coal-burning plant means the opening up of new possibilities in design which may eventually cause a wide dissimilarity between steam and electric locomotive running gear.

In whatever direction the present development stage of electric locomotive design may lead, it has been demonstrated beyond question that the electric locomotive as such has set a standard for reliability and low cost of operation hitherto unapproached by the steam engine. Last winter's accident on the Great Northern Railway, in which all four locomotives were swept off the track by a snow slide but later were raised and repaired for service at an expenditure of but a few hundred dollars each, has done much to establish confidence in this type of motive power. Meanwhile, daily evidence of reliability is being offered by the electric locomotives handling the entire traffic of the three railroads entering New York City. While reliability is only one of the assets of the electric locomotive, it is perhaps lack of confidence in this respect that has hitherto held back its extension to trunk line service. It is, therefore, gratifying to have any fears of this nature dispelled by the daily records of the electric locomotives in operation.

It is difficult to tell the direction in which there will be the greatest development in electric locomotive operation during the coming few years. Up to this time electric locomotives have been used almost exclusively on trunk lines for tunnel service and on elevated and interurban railways for switching service. Their application to pusher service on mountain divisions of steam railroads is yet in the future.

TRACK PROGRESS IN THE YEAR 1910

The past year will be notable for the great amount of constructive work which was done, by both the electric railway associations and individual companies, toward the attainment of higher standards in track construction and maintenance. Among the important problems which received fruitful discussion were corrugation, choice of rail joints, special work, steel ties, timber preservation and parked right-of-way in cities. It may not be amiss to comment briefly in the following paragraphs on some of the work done in connection with each of the subjects noted by the way committee of the American Electric Railway Engineering Association and others.

Rail corrugation theories are more numerous than ever, but a rather popular and convenient one at present is that which asserts that the corrugations are due to irregularities in molecular structure caused by the rails being rolled at too low a temperature. It will be recalled, however, that tests on the hardness of some corrugated rails conducted for the STREET RAILWAY JOURNAL in 1907 by George L. Fowler, and published in the STREET RAILWAY JOURNAL of Oct. 5, 1907, did not disclose any difference in hardness in the metal at the crests and in the valleys of the corrugations. A more elaborate plan to determine whether the rolling mills are at fault is now being carried out by the International Street & Interurban Railway Association. Instead of using the drop test on the rails after they have become corrugated, as was done by Mr. Fowler, new rails will be tested at the mills and will then be laid on 1½ miles of track with various substructures in Berlin. The conditions under which the corrugations begin and continue will then be carefully observed.

The report of the 1910 committee on way matters contained a remarkably interesting section on both mechanical and welded rail joints. One pertinent suggestion was that the deeper types of joint plates should be slightly curved so as to present a concave face to the rail web. It is believed that this change would give a larger surface contact than the present straight joint plates which become convex to the rail web when they buckle in service. Special insistence was placed also on the necessity of grinding or filing the rail ends to eliminate imperfectly surfaced joints of whatever character. This precaution seems obvious, but it is a fact that out of 29 companies which were asked about their practice in this respect 15 admitted that they did not grind the rail ends to a true surface. In addition to several improvements in methods for applying copper bonds, the past year also brought some noteworthy betterments in the different forms of welded joints. The cast weld joint now is made with a water jacket to prevent excessive heating of the railhead; the bars of the new electric welded joint are provided with center offsets to support the rail head and the latest thermit reaction joint gives a weld of the entire rail section. The oxy-acetylene process is now being tried here and abroad both for rail welding and for attaching joint plates, bonds, etc. Like the reaction process, the oxy-acetylene method possesses the great advantage of permitting each weld to be made, and if need be remade, individually without cumbrous apparatus or highly skilled labor. All in all, several satisfactory solutions are now available for treating rail joint and conductivity problems. Many of the changes noted are not so much confessions of previous failures as they are evidences of healthful emulation among the manufacturers and of

the desire of the railway companies to secure a design most suitable for their particular conditions.

In special work, practice is still at odds as to solid or insert lay-outs, although the former are favored for heavy traffic. Valuable help was given to the 1910 committee on way matters by the special work manufacturers in the standardization of switch pieces as to lengths and radii, and also in the standardization of mates and frogs. It is pertinent to point out to those who lay too much stress on "local conditions" that the lead in this field has been taken by a company which probably has more variations throughout its city and country divisions than any other electric railway in existence. Considering the advantages of standardization in first cost, maintenance and stock keeping, there seems little reason why city railways should go to the trouble and expense of using spiraled switches.

The steel tie has made considerable headway during the past year in concrete street railway construction, for which it appears to be most suitable. Improvements have been made in the form of clips used to join the rails and the ties. A steel tie at $2 for an assumed life of 30 years costs about twice as much as a preserved wooden tie of practically equal durability. Its economy, therefore, is due largely to the fact that a smaller number is required per mile. The spacing of steel ties, however, is still involved in uncertainty, for some companies install them at 3-ft. centers and others set them even as far apart as 7 ft. 6 in. It is highly desirable, therefore, that the problems involved in the proper spacing of steel ties should be worked out on a scientific basis for different classes of substructures so that cost comparisons with wooden ties can be made more accurately. Although the steel tie is naturally a part of a concrete track, engineers who have had experience with it believe that some changes should be made in its shape to permit it to be taken out of the concrete at little cost when such removal is necessary during periods of reconstruction. The steel tie is not so desirable in paved streets with stone-ballasted track because the amount of tamping required during the first year of installation leads to a frequent and expensive disturbance of the pavement.

The question of the preservation of the wooden ties is becoming more acute from year to year despite the introduction of the steel tie. In a few years it will be considered foolhardy to install untreated ties under any conditions. Only two large electric railways in this country have practised tie preservation long enough to understand from experience its real merits. One of these companies uses a permeative and the other a superficial preservative. The experiences of these companies have been very favorable, but they do not cover a sufficient variety of geographical conditions of treatments and of timbers to serve as sole criterions for other railways. Exact data are sorely needed on the comparative value of the numerous preservatives now on the market. This subject might well be taken up by a sub-committee on way matters, working in harmony with a similar committee of the American Railway Engineering and Maintenance of Way Association, with representatives of the Bureau of Forestry, and with the experts of the manufacturers of wood preservatives. In such an investigation particular attention should be given to special treatments for ties buried in rock ballast or incased in concrete under street paving. The merits of tie plates and screw spikes in lengthening the usefulness of superficially preserved ties should also form a part of this study. An excellent basis for work of this kind, with reference to city conditions, would be afforded by the chapter on chemical treatment of ties published in the second annual report of the Board of Supervising Engineers, Chicago Traction. The same report also contained a valuable study of problems relating to track deflections and materials in connection with different classes of track and roadways. These data included analyses of manganese steel special work and figures on the comparative holding power of track and screw spikes in different kinds of wood.

Electric railways, both here and abroad, are beginning to agitate more strongly for right-of-way operation through sodded or parked sections of wide city streets. Because of the noiseless and faster service thus made possible, this innovation has met with the strong approval of the public in those cities in this country and abroad where it has been introduced. It is needless to add that the street railways are even more pleased, since their track maintenance cost has been reduced to a minimum while paving expenses and wagon obstructions are simply unpleasant memories. The problem of adequate city transportation is so intimately intertwined with the construction of wide roadways that American street railways would do wisely to discuss city right-of-way operation with their municipalities whenever the opportunity presents itself, either in existing or proposed wide streets.

POWER STATION AND DISTRIBUTION SYSTEMS

Recent power station construction has for its most noticeable feature the simplification of design by the use of larger units, particularly the larger sizes of steam turbines. The ordinary electric road, which at the present time generates its power by three-phase turbo-generators, transmits it to substations, whence it is delivered to the working conductor as direct current. For an equipment of this kind the large turbo-generators now available are quite ideal, being extremely simple and reliable and lending themselves to a very convenient and compact power house design. Hence one recent power station differs from another chiefly in the number and size of the units employed. It is greatly to be regretted, however, that the direct-current turbine has not found its way into greater favor than it has. It is very easy to write eulogistic papers regarding the beauty and simplicity of the standard equipment of three-phase generators and synchronous converters, yet every station operator knows perfectly well that the losses in the system, however well designed, are large and the possibilities of breakdown materially increased owing to the necessary complication of apparatus of this character.

The switchboard of a recent turbo-generator station is a structure of fearful and wonderful complexity, and its cost is a very material fraction of the total cost of the plant. Every railway man knows in his heart that if he could get big direct-current turbo-generators comparable in efficiency and reliability with the big direct-connected engine-driven railway generators he would be very glad to supply from them the major part of the current used on his railway lines, always excepting of course, the purely interurban ones. Undoubtedly the smaller capacities of direct-current turbines are even now in a state of pretty fair development, but much yet remains to be done along this line. Recent advances in the commutating-pole type of construction have brought improvement and are likely to bring more until there will be no hesitation in using

such machines, which are already in successful use in a few places, for the central territory of a road of considerable size. There is no reason, except the absence of suitable direct-current turbo-generators, why power should be generated as alternating current at one end of a good-sized power station and transformed through costly machines at the other end of the station to serve the immediately surrounding territory.

One of the directions in which power-station design has advanced is in the combination of low-pressure turbines with reciprocating engines. This process virtually provides another stage of expansion with its resulting economies, without adding anything more than electrical linkage to the rest of the machine. And it may be pertinent to suggest here that such a combination meets in part the objection which has just been raised to some current power-station practice, because it is a perfectly simple matter to supply the center of a railway network with energy by feeding direct current to it from the engine-driven generators while the low-pressure turbines take care of the outlying lines, through the converters at the substations. At all events the low-pressure turbine furnishes an admirable means of increasing the output and efficiency of existing stations whether the original generators are for direct or three-phase current.

Aside from these considerations in generating practice the most important subject before the railway power station superintendent is the fuel question. The price of fuel has its ups and downs, but the ups are more frequent and permanent than the downs, so that, by and large, the fuel problem is steadily growing in seriousness. The key to the situation unquestionably lies at the furnace. No fact is a more commonplace matter of knowledge than that the cost of fuel is not in direct proportion to its heating capacity. The high-grade coals cost disproportionately more than the low-grade coals, because any sort of firing will yield passable results in almost any kind of furnace with the former and consequently they are in the greatest demand. Researches in the last year or two have made it certain that even the meanest low-grade bituminous coals can give first-class economical results if they are properly fired in suitable furnaces.

The electrical part of the station equipment is, on the whole, in extremely good condition with the exception already noted. The apparatus is reliable, efficient and easily handled. The same is true of the prime movers. The boilers and automatic stokers are reliable enough, but in too many instances they are anything but efficient. Inability to utilize fuel of low cost for its thermal value is the weakest point in modern power generation.

As regards the distribution of power for railway purposes the present standard practice is structurally good; that is to say, when transmission is undertaken it is generally at conservative voltages and utilizes sound and conservative line construction. Only in a few instances does a railway system cover territory extensive enough to warrant using high voltages, and by this term we mean high in the sense defined by Professor Baum half a dozen years ago, when he cheerfully classified as of moderate voltage anything below 30,000 volts. Railway transmission practice, however, differs from that of ordinary hydroelectric systems in that it often involves considerable amounts of power and the lines have to be constructed largely along frequented ways. The overhead construction, therefore, must be adapted to carrying fairly heavy copper and must be to the last degree secure and reliable.

Recent practice in transmission work is tending considerably toward steel pole lines, generally of the tower type, but in the conditions met in transmission for railway purposes tower construction is usually unnecessary and some very successful examples of latticed poles have been installed within the last year or two. In such cases there is a good deal to be said for the beautiful "A" type of pole, used by some of the Italian engineers, which gives sufficient longitudinal flexibility to relieve extraordinary strains upon the line. In the same connection a good word should be said for the suspension insulator which is now beginning to be used for moderate voltages as well as for extreme voltages. A transmission line carried by suspension insulators on a not too rigid steel pole line is about as reliable an overhead structure as could well be imagined and is very well adapted to secure protection from lightning when equipped with a guard wire grounded at every pole. There is an increasing tendency to require railway companies to put their lines underground, a demand which has its origin in a certain distrust of overhead circuits as well as in a desire to get them out of sight. But so long as the trolley wire remains overhead there is little reason for objecting to the feeders also being overhead, and by proper construction the overhead line can be made fully reliable.

The great moot point of electric railroading—that is, alternating current versus direct current in the motors—still remains undecided. Some excellent examples of direct-current high-tension roads of 1200 volts or more have been described in our columns. But voltages like this, however desirable for long-distance interurban service, have merely palliated matters and have left the main problem of heavy work still unsettled. So far as we have observed, the advocates of both systems of working listen more patiently than formerly to each other's arguments, but still remain unconvinced. Even the lengthy discussion of the matter at the Berne Congress during the past summer left in the mind of the reader little except an earnest desire to find some seer able to separate the facts from the hypotheses on both sides of the argument. Meanwhile both systems are practically doing well, so that the argument from experience is of but small assistance to the dubious. Perhaps the only class really grateful for this uncertain state of affairs is composed of the steam railroad magnates, who find therein an excellent reason for doubt and hesitation when confronted by demands for electrification.

The quite ideal system in which long sections of road are supplied at high voltage from a single trolley wire without feeders has not yet been materialized by either party to the dispute. Until this is accomplished distribution for the larger work of railways is still to be deemed among those desiderata whose substance is hoped for but whose evidence is not yet seen. One shudders at the thought of keeping 1000 miles of third-rail system between New York and Chicago clear during an average winter, and if he takes the other horn of the dilemma and visualizes the overhead system of the New York, New Haven & Hartford Railroad along the same far vista, he will derive little comfort from its contemplation. Aside from the commonplaces of ordinary interurban electric railway service, the distribution problem in its relation to the motor service still remains a riddle.

RAIL SECTIONS AND SPECIFICATIONS.

The extremely important subject of specifications for the composition and rolling of rails was among the foremost questions discussed and acted upon during the past year, and its treatment by the committee on way matters of the American Electric Railway Engineering Association was marked by a clear understanding of the essential differences between street railway and steam railroad requirements. The approved 1910 report of this committee recommended for electric railway open-hearth girder and high T-rails a steel containing at least 0.60 per cent carbon, a desired average of 0.68 per cent carbon and a maximum of 0.75 per cent carbon. In this composition the phosphorus was not to exceed 0.04 per cent. The original draft of this committee's report called also for a higher grade composition in which the corresponding minimum, desired and maximum carbon amounts were 0.72 per cent, 0.77 per cent and 0.85 per cent, while the phosphorus was set at the low mark of 0.03 per cent. This higher grade composition was not recommended in the final report, however, because of the manufacturers' refusal to roll a high-carbon, low-phosphorus rail at standard prices. The tendency toward higher carbon content in street railway rails is illustrated in the case of the Metropolitan Street Railway, New York, which has changed over from a respective minimum and maximum of 0.45 per cent and 0.55 per cent to 0.65 per cent and 0.80 per cent. The latest open-hearth rails for the subway service of the Interborough Rapid Transit Company, New York, also show an increase in carbon content, as the permissible limits have been changed to read "0.75 per cent to 0.90 per cent" in place of "0.70 per cent to 0.85 per cent." Since no other electric railway in the world must cope with such traffic as the New York subway, the rails used for this service are mentioned only to prove that the committee on way matters was not demanding an impossibility when it suggested an open-hearth rail with an upper limit of 0.85 per cent carbon whether for T or girder rails. It is to be hoped that during the coming year many railways will order their rails in harmony with the committee's specifications, so that the merits of the proposed standard composition and tests will receive a fair trial.

The standardization of girder rail sections has not made much progress despite the concrete suggestions contained in the 1907 and 1909 reports of the committee on way matters. A settlement of this problem is of the greatest importance to city railways, but we fear that much good committee work will be lost unless recommended standards can be brought more directly to the attention of member companies and others than is now the case. First of all, an earnest endeavor should be made to select the standards from the enormous variety already extant. Secondly, if entirely new sections are considered a necessity it is only fair that the rail makers should have some assurance that enough companies will adopt them as standard to justify the design and construction of the new rolls required. In this question of standard rail sections the United States has lagged behind both England and Germany. The excuse is usually made that the choice of section is dependent upon the city engineer and the local authorities rather than upon the railway company. Surely local authority is supposed to be as strong abroad as here, yet, by a vigorous effort in which in Great Britain the railway companies were supported by the Institution of Civil Engineers, the railway associations and other national organizations, practical standardization has been reached. In Great Britain the five standard rails for tangents weigh respectively 90 lb., 95 lb., 100 lb., 105 lb. and 110 lb. per yard, and the corresponding curved rails 6 lb. more per yard. The German standard city rails for tangents weigh respectively 85 lb., 98 lb., 112 lb. and 115 lb. per yard, and the corresponding curved rails 5 lb. to 6 lb. more per yard. The new German standards have been made effective by a system of co-operation with the rail makers whereby the penalty of higher cost is suffered by those few companies which insist upon something special. It is greatly to be desired that not only shall the 1911 committee on way matters select acceptable standards but that the parent association shall also devise some method to make the recommendations enforceable. A viva voce vote at the convention or even a tacit approval by a letter ballot is a long way from the actual adoption of the standard as certified by the requisition of the purchasing agent.

REGULATIVE LEGISLATION IN 1910

The strongly defined tendency toward further extension of governmental control over the electric railways which marked the early part of 1910 appears to have undergone some change. This is indicated by the political events of the year and by a moderation of public policy which may be temporary or may prove to be permanent. At the beginning of the year the trend of public opinion throughout the country appeared to be definitely in favor of an extension of the national policy of regulation. This was naturally reflected in various movements in States where the Legislatures were in session.

The most important steps taken in the assumption of larger authority were those of the Congress of the United States. These, because of their application only where interstate commerce is concerned, affect only remotely most of the electric railways of the country. In so far, however, as they represent the crystallization of the sentiment of all sections on a subject which is really the control of State corporations that happen to be engaged in interstate commerce they represent a sentiment that may easily drift in its application from the greater national problems to those of more purely State or local importance.

It was pointed out by the committee on interstate commerce commission affairs in the report presented at the last convention of the American Electric Railway Association that of 74 bills relating to interstate commerce which were presented during the first and second sessions of the Sixty-first Congress of the United States but four became law. The most important of these was the act which created the commerce court and amended further the interstate commerce act.

A section of this act which is of potential importance is that which authorized the President to appoint a commission to investigate questions pertaining to the issue of stocks and bonds by railroad corporations. This was a more temperate treatment of the subject than that which was proposed in some of the bills introduced in Congress in reference to this matter. The scope of the inquiry upon which this commission has entered is indicated by the preliminary hearings. The commission is taking testimony from eminent bankers, lawyers and corporation representatives and public officials of the country. The opinions which it solicits touch not only the expediency of the regulation of securities by the United States government but also the subject of the power of Congress in this matter.

In the ultimate disposition of the questions involved, if final

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decision is to be made, the position of outstanding securities as well as the terms on which new issues are to be made must receive consideration. When the investigation shall have been concluded and the report placed before the country there will be an opportunity to pass upon the conclusions of the commission. It should be remembered that the commission was appointed in pursuance of the policy of the party in power to enlarge to an almost unlimited extent its control over railroads engaged in interstate commerce. As that party did not meet with the same favor at the hands of the people at the elections in November that it had enjoyed theretofore, some of the issues which it has raised will be settled by others whose real views and strength can scarcely be judged accurately and in full so far in advance as this.

There is one other reason why we refer thus at length to the additions made by Congress to the act to regulate commerce. Because of the obstructive policy of the government the increases in rates desired by the steam railroads have been held in abeyance pending determination as to their reasonableness. These increases were designed to offset in part the larger expenses to which the companies have been put by advances in the rates of wages of employees. If allowed, they will be a forceful argument for the electric railway companies which are in a position to make or seek higher rates of fare. In an editorial published in our issue of May 7, 1910, we pointed to the moral effect of the salutary object lesson which was afforded by the movement for advances in steam railroad rates. This effect will not be diminished but will rather be enhanced if the increases pass the tests imposed by the legislation of 1910.

In the various States less legislation designed to create or extend commission control over electric railways was enacted than was threatened. The State of New York amplified and made clear some of the provisions of the public service commissions law which relate to street railroads. In New Jersey a law was passed and became effective which enlarged the powers of the Railroad Commission, extending jurisdiction over other classes of public utilities. Through the passage of a law similar to the original law creating the New York commissions the State of Maryland created a public service commission.

No one less than an inspired prophet could predict the ultimate results of the sessions of Legislatures, but the questioning attitude which the public has assumed toward the national policies of the party in power and the surprising victories of the Democratic party point to change.

The year 1910 closed therefore with regulative policies in less definite shape than they held twelve months ago. That there will be a gradual extension of the policy of regulation through the creation of new commissions is a probability which is made stronger by the expressions of feeling in various parts of the country against the "new nationalism" and in favor of a vigorous assertion of State rights. But the powers given by new regulative laws should be limited and made reasonable if the companies concerned present their needs. Where there is to be legislation, reasonable laws and men who will enforce them in a reasonable way are the essential requirements for success. Both the proponent of radical restrictive legislation and the corporation official who resents any suggestion or inquiry from the public as an intrusion should give way to legislation which will lead to co-operation and a recognition that each interest has rights which the other is bound to respect.

THE ELECTRIC RAILWAY SITUATION IN 1910

The electric railway situation was affected during 1910 by an unusual number of influences of a political and business nature, national, State and local. The results of operations and the present outlook, therefore, vary to an unusual extent with the companies throughout the country. So far as we can judge from a number of individual experiences, the grand totals of gross traffic and gross revenues of all companies, if available, would show substantially the same average increases which, under all circumstances but those of extraordinary depression, continue, as a rule, to be made from year to year by local public utility corporations of all classes. Gross earnings of electric railways increase when the total business of the country increases. It is the experience of most companies that gross earnings decrease to a very small extent or remain on about a level with the previous year when the gross volume of general business decreases. Changes are very rarely as sudden or sharp, however, as with other industries.

The general business of electric railways, their financial condition and their plans for future expansion are still to an extent under the pall of the panic of 1907, from which the country as a whole has not yet entirely recovered. The slower development of the industry is due in part to the banking and investment attitude of the country, which has consistently operated to produce a policy of conservatism and to restrict expansion. The situation has not been wholly favorable for either temporary or permanent financing by established companies, and it has been still less encouraging for new enterprises.

When electric railways borrow on short-time notes they usually do so in anticipation of the sale of long-time securities with whose proceeds they redeem the short-time obligations. The bond market in 1910 was poor. As the public did not buy securities freely, the bankers, who are the wholesale purchasers, were not willing to buy freely. It was a question more of unreceptive markets than of prices. Electric railway securities are not ordinarily subject to the same extremes of market fluctuation as the great steam railroad and corporation issues, which have had a year of depression and unsatisfactory salability on the New York Stock Exchange. This redeeming fact is due in part to better sustained gross earning power, although it is true that issues of stocks and bonds of individual electric railway companies are not sufficiently large to facilitate trading in heavy or frequent volume.

The influences that determine the state of the invesment market from year to year were complicated in 1910 by the demand for money throughout the civilized world and by the public utilities legislation pending and threatened by the national and the various State governments. A policy of financing by the sale of preferred stock, instead of bonds, has been followed by some companies with distinct success. While this tends to make the net cost of the capital higher, it is permanent financing, the necessity of refunding in the future is avoided, and it has the additional advantage of substitution of a voluntary dividend payment for a fixed interest charge. Curtailment of fixed charges may prevent receivership in the event of a prolonged period of business distress. While the more general issue of stock instead of bonds is to be recommended as a wise protective measure, the record of

electric railways in this respect compares favorably with that of the steam roads. The 1907 census report showed that of the total outstanding capital of street and electric railways (operating and lessor companies) 44.43 per cent was represented by funded debt. The corresponding percentage for steam railways, as shown by the Interstate Commerce Commission report for the same year, was 54.25.

More widespread and severe effects from the depression that followed quickly after the panic of 1907 were felt by electric railways located in some of the mining and industrial regions of Pennsylvania than by the companies engaged in this business in any other general section of the country. The chief industries in Pennsylvania districts thus affected are mining and the manufacture of iron and steel products and coke. Early in 1908 some of the electric railways in these regions showed reductions of gross earnings as compared with the corresponding period of the previous year, which amounted for a time, although a very brief time, to as much as 40 per cent or 45 per cent. Recovery has been slower in these districts than in other sections, but 1910 showed material improvement. In some parts of the country continued development has caused an increase of gross earnings where there was a sharp reduction in 1908. However, the experiences of individual companies have been so varied that in attempting a review of the entire situation we are justified only in pointing to the records of certain groups of representative companies under common control, which showed fair general increases until October or November, when the recession in business began to produce some decreases which lessened the previous satisfactory gains.

As a result of continued higher costs of labor and materials, operating expenses rose still further during the year. The same difficulties of securing competent, dependable men at the established scales of wages were experienced as in more prosperous years, although in a less accentuated degree. The maintenance policy of the companies shows as great diversity as any other feature of their operations. Many roads which were obliged to meet higher transportation expenses reduced their expenditures for maintenance in order to keep a balance. As the rate of fare on city lines is almost universally inflexible under the terms of franchise contracts, only a few urban companies have been able to recoup themselves by increases in the fare unit. On interurban lines many readjustments and increases have been made. Distinct improvement in the average results per passenger carried has been effected in a number of cities by a comprehensive rearrangement of the system of free transfers. By elimination of the illegal and unwarranted use of transfer privileges some unnecessary riding has been stopped and various forms of gross abuse have been ended.

The unadaptability of the short-term franchise to the real needs of the community has been emphasized by the experience of the companies which furnish the urban railway service in Cleveland, Detroit and Toledo. No plan of contract which jeopardizes, either in theory or in fact, the enormous capital investment that is required to produce a satisfactory system of transportation for a developing city is entitled to acceptance as in the true public interest. When the date of expiration of such contracts is near financing becomes difficult and the disappointed holders of securities sell at a sacrifice. The lessons of the year point with new force to the reasonableness of unlimited franchises of the character of those granted in the States of Massachusetts and New York.

As the new year opens the situation is complicated by the political changes which the elections of November have brought throughout the country. What effect these new forces will produce on the conditions governing business and on the great problem of the national election of 1912 only time will show. Business hopes for early decisions in the trust cases before the United States Supreme Court and in the steam railroad rate cases in which testimony has been presented before the Interstate Commerce Commission. Freedom from general unrest in business will help all industries and thus promote the development of electric railways. Projects involving enormous outlays of capital in Boston and New York will progress further during the coming year, and in other large cities of the country definite or tentative steps toward the creation of greater transit facilities will be taken. These will involve, we believe, greater capital requirements than the additions and betterments of 1910.

The greater conservatism which marks the status of the electric railway situation at the turn of the year affords a wholesome opportunity for the companies to consider the weaknesses and the strength of their position. Weaknesses lie in franchise conditions, public relations, loose transfer regulations, extensions built because of over-enthusiasm, the need of better trainmen and the constant demands for more and better facilities and, in spite of all that may be given, the equally insistent demands for lower fares and longer hauls. Strength lies in the provision of a service which is one of the most necessary conveniences of life. The electric railway company and the community are interdependent.

THE INTERURBAN RULES SITUATION

Practically all of the members of the American Electric Railway Association are anxious for that body to designate as standard a new code of rules for interurban electric train operation. Such a code should be of such general applicability that it could be used as a foundation on which every interurban company can formulate a set of rules suitable for its local conditions. One of the committees of the Transportation & Traffic Association now has this work in hand, but it has not yet met, so that its program during 1911 cannot definitely be announced. The executive committee and the association as assembled at Atlantic City outlined certain work for this new committee. These assignments included the following:

To confer with the American Railway Association and attempt to adjust discrepancies between the A. R. A. code and the 1910 T. & T. code.

To confer with the city rules committee and adjust conflicts with the standard city rules.

To take under consideration the extent to which prepayment service will affect any set of interurban rules.

To ascertain what action has been or probably will be taken in the near future by national or State commissions regarding interurban rules.

It is not our understanding that the Transportation & Traffic Association at the Atlantic City convention last fall voted either its approval or its disapproval of the code presented by the 1910 committee. Rather, it recommended that

the rules committee study the interurban rules situation for another year and present its suggestions. It can continue to work along the lines followed by the 1910 committee or not, whichever plan it thinks will best meet the requirements of a majority of the interurban railway companies which are members of the association. The rules committees in the past have repeatedly urged the member companies to state these requirements with definiteness. Nevertheless there has been a paucity of both information as to existing conditions and expressed opinion as to the proper rules. It is sincerly to be hoped that the roads will assist the rules committee during the coming year in this respect better than in the past. It is very necessary that only such a code be adopted for general use as seems to fulfil the requirements after diversified opinions and criticisms have been expressed in a country-wide discussion. We think we are safe in saying that the chairman of the rules committee is anxious to receive letters on the subject, and, as is quite generally known, the columns of this paper are always open for expressions of opinion on any subject of such general welfare as that of improved interurban rules.

Unless preliminary thought is given to the rules situation by others than the members of the committee, the real purpose of the appointment of the rules committee will not be accomplished. When the subject is under discussion in convention the tendency of those who have not followed the work of the committee previous to the convention is to explain why the rules do not fit their local situations. Thus time is wasted and the subject, as at Atlantic City, is tabled for another year.

Should this year's committee decide to take the 1910 code as a basis for its work and then be able to formulate its recommendations and publish them as early as June, ample time would be allowed for its revision by the committee previous to the presentation of the report in the fall. If this is done decisive action should be expected at that time.

The foregoing remarks indicate the situation which confronts the present rules committee. No committee, even though composed of men carefully chosen to represent the best ideas and practices of all sections of the country, can formulate a code of rules which will be found acceptable in their entirety to all companies. In electric railway train service, as in any other specialized business, the individuality of the man in charge is prominently reflected. The superintendent of an interurban road in the East, for instance, has to deal with a certain kind of employees and operating conditions and if he has been following certain methods successfully he will naturally think that no others will meet his local conditions. A similar procedure will be followed by the man in the West. Each will believe that his methods are the best which he can use and will object to a code of rules not in accord with his practice. This parallel between the Eastern and the Western man might just as well have been drawn between the man who has been brought up in the interurban school and the graduate of the steam-railroad school. One feels that the steam code will not suffice for his service and the other holds similar ideas about the interurban code. Numerous examples of men holding the contrary views just presented can be found among the member companies of the association, and so the difficulty of obtaining a code which will meet the views of the operators of all roads grows.

This rules situation is similar to that which confronted the standardization committee of the Engineering Association. This committee at first attempted to design or select certain car parts of such dimensions as would most nearly meet the average conditions as they existed. Later the committee realized that the subject in hand had a broader aspect than that of choosing compromise designs. Then the committee resolved itself into a body of designing engineers. During the last few years this committee, in connection with the committees on special topics of the Engineering Association, has originated designs which are intended as models for the future rather than as adjustments for the present. It has been the idea to place before the association designs toward which the companies might work, and when car parts conforming to these designs could be introduced on a road vast benefits to be obtained from standardization would be realized. Briefly, the committee has given up the idea of restricting its recommended practices to those which might at once be adopted on the average road. In contrast, it has undertaken to present correct, and one might say almost ideal, designs toward which the roads should work.

Whether or not the interurban rules committee can pursue similar methods is doubtful. Nevertheless, we feel that the men chosen to represent the association on the rules committee have been and are of such high quality as operators that the association as a body should place upon them the responsibility of deciding upon all details and could safely confine its discussions at conventions to the general principles involved in the rules which the committee recommends. In this way only can the association get a well-thought-out code which can safely be used by any company as the foundation for a set of rules to serve for any particular road.

The need for standardization of rules hardly calls for repetition at this time, since it has been presented in these columns many times. Probably the prime reason that has actuated the standard rules movement has been the desire for increased safety. It is well known that a trainman operating under one set of rules may by a sudden mental reversion to a contrary practice formerly allowed endanger the safety of his passengers. Such an act would hardly be called carelessness. It is rather a weakness of the mind which is known often to exist and must be guarded against in every possible way. A most effective precaution against this danger is uniformity in rules and in train operating practice. It is noteworthy, in this connection, that the several regrettable accidents of this fall were not caused by a misinterpretation of the rules.

The three more important features to be held in mind when considering the choice of a code of interurban rules are in the order of their importance: (1) Does it supply the necessary degree of safety? (2) Are the rules sufficiently plain for prompt assimilation by a trainman? (3) Will the code facilitate the economical performance of train service?

These are the objects sought, and these purposes should not only direct the work of the rules committee, but should also control the criticism of the conclusions reached by the committee. Finally, we bespeak for the committee the most cordial co operation on the part of other managers. Theirs is a most difficult task. It involves a reconciliation of many diverse views, yet we feel that it is not impossible of accomplishment if each person interested will approach the subject in a broad-minded way and bring to its solution as much careful consideration as if he personally were a member of the committee. If

this plan is followed at least a satisfactory start will be made this year upon the general adoption of a standard set of interurban rules.

ASSOCIATION WORK

Five years have passed since the American Street Railway Association was reorganized in Philadelphia. This is a sufficient length of time in which to judge the success or nonsuccess of the principles then adopted. The general plan of organization was patterned largely after that of certain existing associations, particularly that of the American Association for the Advancement of Science. Nevertheless, it was largely experimental and depended for its success upon the co-operation of a widely distributed membership, bound together more by common interest in the advancement of the art than by commercial ties. It is not too much to say that the progress made during the past five years has been far greater than many of those instrumental in the reorganization in Philadelphia in 1905 anticipated and that it has realized the best hopes of those who were sanguine of its success. Although a considerable increase was made in the annual dues required of member-companies, the growth of the association in number of members has been continuous since 1905. In work accomplished the development has been even greater, as a survey of the printed proceedings of the association for the past five years will show. Since the association is now beginning its second half decade of existence and has adopted a new name more in consonance with the field which it covers, the present seems a suitable time to discuss briefly its past work and future problems. In doing so the logical plan is first to review what questions have been solved as a result of the experience of the last five years and then to consider what remains to be done.

Chief among those questions which seem to have been settled satisfactorily is that of general administration. The plan of a central organization, represented by the permanent office of all five associations, gives a stability which was not possessed by the old organization, and the secretary's office has proved not only desirable for many of the committee meetings, but also efficient in collecting and distributing data of various kinds. The autonomous organization of the affiliated associations, with their numerous committees, gives wide opportunity for individual initiative and preferment while assuring co-ordinated and well directed work by the different organizations. No conflict in regard to spheres of work has occurred between the affiliated bodies, although several subjects have been taken up in common. Of these there will doubtless be more as time goes on. Thus far there have been only two joint sessions and these have been held by the Accountants' Association and the Engineering Association, although joint committees have met on other occasions. Again there has been no lack of subjects. The difficulty up to this time has not been in finding subjects to consider, but in finding time to discuss them.

The financial condition of the association is equally satisfactory. The last report of the treasurer shows a surplus of about $5,000. This gives a slight margin for increasing the efficiency of the association. The total budget, it might be added, is less than that of organizations with whose work that of the association is most nearly allied.

In looking toward the future the principal question to be solved is that of increasing the membership, both active and associate. The membership list of the association is now well representative of the country, but it still falls short in number of what it should be when the value of the work done by the association to the industry at large as well as to individual roads is considered. On Dec. 31, 1910, the percentage of companies in the United States and Canada which were members of the association was only a little over 27 per cent, and the proportion of electric railway mileage represented in the association as compared with that in the entire country was 64 per cent. The statistics on the mileage basis for the groups of States were as follows: In New England 68 per cent of the total electric railway mileage belongs to companies which are members of the association; in the Eastern States the percentage is 55; in the Central States it is 67; in the Southern States it is 72, and in the Western States it is again 67. These figures show that the same ratio holds remarkably closely in most parts of the country, but also that there is still opportunity for strong missionary work. It might be interesting to add in this connection that 288 different electric railway companies had representatives present at the last Atlantic City convention and that last year 204 men were engaged in committee work in addition to those on the active and associate membership committees.

It is useless to expect that every company in the country will become a member of the association. There will be a percentage in every State to which, either because the road is in the hands of a receiver or from some other cause which is controlling, membership seems impracticable. The only thing to do in cases of this kind is to make the membership as near 100 per cent as possible. With the associate membership there is not the same limitation. The associate members of the association are much greater in number than a year ago and very much greater than two years ago, but the associate membership is still small compared with possibilities and compared with the number of the individuals who are interested or actually engaged in the industry. It is true that when a comparison is made with allied lines of industry, like the lighting industry, the number of operating companies is small, but the investment and the number of employees per company are much greater. Any addition to the active and associate membership of the association would not only be a great help to its finances and thus would increase the work which the association can do, but it would also enlist a large body of individuals who have a personal interest in co-operating in its aims. The plan adopted this year of definitely grouping the associate members with the particular association with which they wish to affiliate themselves should bring each associate member more closely in touch with the line of research in which he is most closely interested.

Another question concerning the organization as a whole not yet settled is that of the location of the annual convention. Undoubtedly the action taken at the Atlantic City convention not to accept the proposition of Saratoga Springs was a wise one, but it leaves the executive committee in the dilemma this year of being obliged either to hold the 1911 convention at a place which has already been visited three times, or to begin a weary hunt for some other city which will possess the almost impossible qualifications of good hotels with ample capacity and charging reasonable prices, conveniently located to a hall with proper facilities for caring for the exhibits and for the association meetings. This is one of the first problems to be

undertaken by the present executive committee of the association.

Besides these questions which face the association as a whole, each of the five departments into which the activities of the body are divided has its own problems. We shall not attempt to discuss these in detail because they are treated at length in this issue by the presidents of the four affiliated associations as well as by Mr. Brady, president of the parent body. It is instructive to note, however, that each of these contributors sees opening before the association of whose work he treats a widening vista of opportunity and usefulness. In no one year probably have more questions presented themselves for solution in each of the fields represented by these different sections. Certainly they have not been so apparent in earlier years. Standardization of equipment is being taken up for the first time actively with other national and State associations by the Engineering Association. The matter of standardizing rules and of determining the practical advantages and limitations of signal systems in connection therewith is confronting the transportation managers. The subject of signals will be taken up this year by the Transportation Association in connection with the Engineering Association. The detection of fraudulent claims by means of a central bureau is closely engaging the attention of the claim agents. The advice of the accountants is being demanded by two of the other affiliated associations on questions which concern them, and in addition the accountants have before them the multifarious questions which belong peculiarly to their department.

Among the problems of the parent organization that of public relations seems most important. Mr. Brady's article outlines clearly the economical and political conditions which have brought many of these problems to a focus during the last few years, especally during 1910, and comments upon the similarity of their aspect in all parts of the country. He also explains the importance to the public and the railway interests, but particularly to the latter, of a settlement of these questions upon an equitable basis and with a full understanding of all the conditions rather than by hasty and unconsidered action. It is fortunate that the industry should have had at the beginning of the present year such a clear exposition of the present purposes and objects of the American Electric Railway Association as that contained in Mr. Brady's article. Active work on the part of the committees of the association has already been commenced, and undoubtedly at the midyear conference, on Jan. 27, the reports of that already accomplished or under consideration by them will be presented to the members.

THE ENGINEERING ASSOCIATION "QUESTION BOX"

The executive committee of the Engineering Association at its last meeting discussed the advisability of discontinuing the publication of the "Question Box," which has been a feature of the convention program of that association since 1904. As a substitute it was proposed that the secretary of the association should act in the capacity of an information bureau and obtain directly from member companies answers to any questions relating to engineering matters which might be referred to him. It has been apparent for the last two years that interest in the "Question Box" has been lagging. Comparatively few of the questions have been of especially timely or general interest, and the answers, for the most part, have conveyed little information of real value. Other associations which have conducted a "question box" in the past have had a similar experience. After a few years of existence the plan has been abandoned because of lack of interest.

A "question box" is a convenient and simple medium for the general exchange of specific information about the details of any industry. The value of this interchange of ideas and experience is not confined alone to the men who prepare the questions or write the answers. In nearly every railway organization there are men in subordinate positions who are eager to learn the practice of other companies on the specific points considered, but have few opportunities for personal observation outside of their own city. If the Engineering Association through the "Question Box" can be of help to these men in enlarging their knowledge and usefulness to their employers, the time and money spent in the preparation of the questions and answers once a year should not be begrudged. One way to improve the "Question Box" would be to give these men a better opportunity for submitting questions relating to practical details of their work and for answering the questions which are asked. Under the present plan a circular requesting suggestions for questions is sent to member-companies and associate members early in the summer. This circular reaches busy heads of departments, who give it only passing attention, and later on when the data sheet containing the questions submitted is sent out comparatively little attention is paid to preparing answers, except in a few individual cases. A few duplicate copies of both the circular and the data sheet could be sent to each member company with a request that they be distributed among the foremen and others in subordinate positions who might be interested. This would entail but little extra cost and would tend to create interest in the association's affairs among a class of men who at some future time may develop into active and valuable members.

The proposed substitute plan of having the secretary of the Engineering Association act in the capacity of an information bureau has been followed by the American Association for a number of years, but the general distribution of the information collected and compiled in the form of confidential bulletins to member companies entails a large amount of clerical work and is expensive. While similar bulletins of the Engineering Association seldom would contain information of a confidential nature, they would never be so widely distributed as the "Question Box" now is and the data contained in them would not be generally available. It might be worth while to give the plan a trial for a year before deciding to abandon the "Question Box" if that step seems advisable. If the two methods of collecting and disseminating information are continued the "Question Box" should be expanded to include all of the data published in the bulletins, as well as the usual questions and answers on subjects of minor importance.

In the past the "Question Box" has contained a vast quantity of extremely valuable data covering a wide range of subjects, but for lack of an index information on any particular point can be found only after a long search through the volumes of previous years. It would not entail a great deal of labor or expense to compile an index or classified list of the questions asked and answered during the last six years and to include this index in the future in the proceedings, where it can be permanently preserved and brought up to date each year.

ELECTRIC RAILWAY ROLLING STOCK ORDERED IN 1910

The orders placed by electric railways for rolling stock in 1910 are shown in the accompanying table. The total of all cars, locomotives and miscellaneous rolling stock ordered was 5481, an increase of 10.6 per cent over 1909. As in previous years the table has been compiled from the Electric Railway Journal records kept from week to week, from data received from the railway companies on special blanks sent to them and from records obtained from the car building companies.

The orders, classified according to the service in which the cars are used, are given below.

	1907	1908	1909	1910
Passenger cars, city	3483	2208	2537	3571
Passenger cars, interurban	1327	727	1245	990
Freight and miscellaneous cars	1406	176	1175	820
Total	6216	3111	4957	5481

It will be seen from the foregoing annual comparison that 1910 was marked by greater activity in the total purchases of rolling stock than 1908 or 1909, but it was 735 cars short of the total orders for the year 1907.

Among the striking features of rolling stock orders last year was the increase in the number of prepayment cars, of which 1878 were purchased, as compared with 1096 in 1909. These figures relate only to new cars; they do not include rolling stock which was rebuilt for prepayment operation. The prepayment cars are marked by an asterisk (*) in the accompanying table.

There was a decrease of 255 in the total orders for interurban passenger cars, or 20.4 per cent as compared with 1909.

The figures for interurban cars include orders for elevated and subway equipment. The greater attention which has been given to the maintenance of service in winter is indicated by the purchase of 117 snow plows and sweepers.

The number of electric locomotives ordered was 43 as against 49 in the preceding year. However, 24 of the 49 locomotives ordered during 1909 were for the New York electrification of the Pennsylvania Tunnel & Terminal Company. It should be noted in connection with the accompanying table that in the case of electric locomotives the truck column gives the name of the company which constructed all the mechanical parts, while the column headed "builder" shows the name of the company which manufactured the electrical equipment.

ROLLING STOCK EQUIPMENT ORDERED IN 1910

Purchaser	No.	Class	Length	Serv.	Truck	Builder
Aberdeen Ry	7	Closed	22–0	City	.....	.....
	1	Pl. & Wk.	....	City	.....	.....
Alton, Jack. & Peoria Ry	5	Closed	55–0	Int.	.....	American
Arkansas Valley Inter. Ry	1	Closed	52–0	Int.	Bald.	Jewett
Asheville Electric Ry	4	Open	....	City	Brill	Brill
	2	Semiconv.	30–1	City	Brill	Brill
Atchison Ry., Lt. & Pwr.Co	5	Semiconv.	27–4	City	Brill	Brill
Athens Elec. Ry	3	Open	35–0	City	Brill	American
	3	Closed	34–10	City	Brill	American
Atlanta Northern Ry	2	Trail C.	30–8	Int.	Brill	Brill
Atlantic Shore Line Ry	1	Semiconv.	40–1	Int.	Std.	Stephenson
Aurora, Elgin & Chicago R.R.	5	Closed	32–0	City	Brill	Niles
	1	Comb.	50–0	Int.	.....	Russell
	1	Express	46–0	Int.	....	Niles
	1	Sweeper	29–0	City	Mc.-C.	McGuire-C.
Austin Elec. Ry	3	Open	31–0	City	Balt.	Southern
Bakersfield & Kern Elec.Ry	6	Closed*	40–0	City	Brill	American
Balt. & Wash. Transit Co	2	Gas. Mot.*	30–6	City	Brill	Stephenson
Bangor Ry. & Elec. Co	2	Semiconv.	30–8	City	Brill	Brill
	1	Express	30–0	City	Brill	Brill
Beaumont Traction Co	3	Semiconv.*	37–4	City	Brill	American
Beloit Traction Co	2	Closed*	40–0	City	St. L.	St. Louis
Belton & Temple Traction Co	1	Flat	24–0	Both	Am.	Co. Shops
	4	Dump	18–0	Both	St. L.	Co. Shops
Birmingham Ry., Lt. & P. Co	9	Closed	36–0	City	Balt.	Mc-Guire-C.
	4	Freight	36–0	City	Co.	Co. Shops
	1	Concrete	....	City	Co.	Chic. C. M.
Bluffton, Geneva & Celina Trac. Co	1	Closed	52–0	Int.	Tay.	Jewett
	1	Frt., Box	50–0	Int.	Tay.	Interstate
Boise Interurban Ry	1	Closed	31–8	Int.	Brill	American
	2	Closed	....	City	.....	St. Louis
	1	Comb.	41–0	Int.	Brill	American
Boston Elevated Ry	50	Semiconv.*	48–2	City	.....	Laconia
Bos. & Me. R.R. (for H. Tun.)	5	Elec.Loco.	48–0	P.&F.	Bald.	West
Boston & Northern St. Ry	24	Open	40–11	Both	Std.	Stephenson
	2	Work	35–0	Both	Std.	Smith & W.
	4	S. T.Plows	26–0	Both	Was.	Wason
	2	D.T.Plows	47–0	Both	Was.	Wason
	1	D.T.Plow	44–6	Both	Rus.	Russell
Boston & Worcester St. Ry	5	Closed	46–8	Int.	Std.	Osg. Brad.
Brooklyn Rapid Transit Co	1	Sweeper	28–3	City	Mc.-C.	McGuire-C.
	1	Elec.Loco.	29–4	Freight	A.L.C.	Gen. Elec.
	1	Lococrane	23–4	City	Br'n	Brown
British Columbia Elec. Ry	10	Closed	44–0	Sub.	Brill	Preston
	5	Semiconv.*	44–10	City	Brill	Ottawa
	5	Semiconv.*	42–6	City	Brill	Stephenson
	38	Semiconv.* & 45-0	43–6	City	Brill	Co. Shops
	4	Baggage	53–8	Int.	Brill	Co. Shops
	1	Express	50–0	Int.	Brill	Co. Shops
	1	Work	36–0	Int.	Brill	Co. Shops
	50	Frt.,Box	41–0	Int.	.....	Hicks
	25	Flat	40–0	Int.	.....	Hicks
	25	Flat	41–0	Int.	.....	Canada
	50	Flat	41–0	Int.	.....	Seattle
	1	Snow Plow	....	Int.	.....	Co. Shops
	1	Sweeper	30–0	City	Brill	Ottawa
	1	Sprinkler	....	City	Brill	Brill
	3	Elec.Loco.	33–0	Int.	Brill	Co. Shops
	4	Caboose	....	Int.	.....	Seattle
	12	Stock	....	Int.	.....	Canada
Bryan College Int. Ry	1	Trailer, C.	....	Int.	.....	Fairbanks
	4	Gas.Mot.	19–0	Int.	.....	Fairbanks
Buffalo & Lackawanna Tr.Co.	5	Comb.	47–2	Int.	Bald.	Cincinnati
Burlington Trac. Co	3	Closed	28–0	City	Tay.	Jones
Butte Elec. Ry	1	Closed	35–0	City	Co.	Co. Shops
Caldwell Trac. Co	1	Closed	....	Int.	Co.	St. Louis
Calgary St. Ry	3	Closed	46–6	City	Brill	Ottawa
	3	Semiconv.*	46–0	City	Brill	Preston
	12	Semiconv.*	33–6	City	Tay.	Preston
California St. & Cable R.R	2	Calif.	....	City	Co.	Co. Shops
Cape Girard.-Jack. Int. Ry	2	Open	35–0	City	Brill	Brill
	6	Closed	30–1	City	Brill	Brill
	1	Comb.	30–0	City	Brill	Brill
Capital Trac. Co	150	Closed*	41–0	City	Brill	Jewett
Carlisle & Mt. Holly Ry	1	Gondola	22–0	City	Brill	Brill
Centerville Lt. & Trac. Co	1	Closed	31–0	City	St.L.	St. Louis
	1	Comb.	41–0	Int.	Mc.-C.	McGuire-C.
Central California Trac. Co	4	Closed	50–0	Int.	Brill	Holman
	2	Comb.	40–0	Int.	Brill	Holman
	5	Express	36–0	Int.	Hol.	Holman
	1	Express	45–0	Int.	Brill	Holman
Central Kentucky Trac. Co	4	Comb.	52–8	Int.	Brill	Brill
Charles City Western Ry	8	Semiconv.*	24–0	City	St.L.	McGuire-C.
	1	Gas.Mot.	55–0	Int.	McK.	McKeen
	1	G.M. Loco.	....	Int.	McK.	Co. Shops
Charleston Con. Ry.& Lt.Co.	4	Semiconv.	30–1	City	Brill	Brill
	4	Open	43–0	Int.	Brill	Brill
Chat., Wall'b'g & L.Erie Ry	2	Trailer, O.	....	Int.	.....	.....
	3	Frt., Box	....	Int.	.....	.....
	17	Fl.&Gon.	....	Int.	.....	.....
	1	Ballast	....	Int.	.....	.....
	1	Snow Plow	....	Int.	.....	.....
	2	Elec.Loco.	....	Int.	.....	.....
Chattanooga Ry. & Lt. Co	10	Closed*	45–0	City	Brill	Kuhlman
	2	Dump	....	City	K.&J.	Kilbourne & Jacobs
Cheyenne Elec. Ry	1	Semiconv.	33–0	City	Brill	Brill
Chicago, Aurora & DeK. R.R	3	Comb.	45–0	Int.	Tay	Danville
	1	Express	45–0	Int.	Mc.-C.	McGuire-C
	6	Dump	36–0	Int.	.....	Western
Chicago City Ry	2	Funeral	42–1	City	Brill	Kuhlman
	1	Sweeper	28–3	City	Mc.-C.	McGuire-C
	1	Closed	44–2	City	Brill	Co. Shops
	1	Closed	45–2	City	Brill	Co. Shops
Chic., Har. & Gen. Lake Ry	1	Flat	36–0	Int.	.....	Hicks
Chicago & Joliet Elec. Ry	4	Closed*	34–0	City	Cin.	Kuhlman
	2	Comb.*	40–0	City	Brill	Brill
	1	Pl.& Spr	33–6	Int.	Mc.-C.	McGuire-C.
Chicago, L. S. & So. Bd. Ry	3	Closed	57–0	Int.	Bald.	Niles
Chicago & Mil. Elec. Ry	1	Express	51–6	Int.	Bald.	Co. Shops
	1	Snow Plow	34–0	Int.	.....	Co. Shops
Chicago Railways	215	Closed*	....	City	.....	Co. Shops
	2	Dump	....	City	Co.	Co. Shops
	1	Derrick	....	City	Co.	Co. Shops
Chickasha St. Ry	1	Closed	30–1	City	Brill	Brill
Chillicothe El. R.R. L.&P.Co.	1	Sweeper	....	City	Brill	Brill
Cincinnati Trac. Co	50	Open	30–3	City	Brill	Cincinnati
	18	Dump	15–0	City	.....	Continental
	1	Lococrane	....	City	.....	Browning
Citizens' Ry	3	Semiconv.*	30–8	City	Brill	Danville
	1	Flat	20–8	City	Peck	Co. Shops
	1	Sprinkler	20–8	City	Peck	Co. Shops
Citizens' Trac. Co	2	Closed	30–0	City	Brill	American
City of Raleigh, N. C	1	Sprinkler	....	City	Mc.-C.	McGuire-C
City & Suburban Ry	2	Open*	28–8	City	Brill	Brill
Clarksville Ry. & Lt. Co	4	Open	27–6	City	Brill	Danville
Cleburne St. Ry	3	Closed*	30–1	City	Brill	Danville
Cleve., Painesv'le & E. R.R.	3	Closed	52–0	Int.	Bald.	Niles
Cleveland Ry	25	Closed*	51–6	City	Brill	Kuhlman
	2	Sweeper	28–3	City	Mc.-C.	McGuire-C.
Clinton St. Ry	2	Semiconv.	30–1	City	.....	American
Colorado Ry., Lt. & P. Co	1	Elec.Loco.	36–0	Coal	Co.	Co. Shops
Colorado Springs & Inter. Ry	7	Trailer, C.	....	City	Co.	Co. Shops
Colum. Elec. St. Ry.L.&P.Co.	4	Semiconv.*	43–0	Both	Brill	Brill
Columbus Del. & Marion Ry.	1	Express	55–0	Int.	Peck	Jewett
Columbus, Mar. & Bucy. Ry.	2	Closed	54–0	Int.	Curtis	Jewett
Columbus R.R.	3	Closed	34–4	City	Brill	Southern
Columbus Ry. & Lt. Co	7	Closed*	31–6	City	Brill	Kuhlman
	4	Closed	46–6	Int.	Brill	Kuhlman
Columbus, Urb. & W. El. Ry.	1	Semiconv.	50–0	Int.	Mc.-C.	Jewett
Conestoga Trac. Co	1	Open	28–8	City	Brill	Brill
Coney Isl. & Brooklyn R.R.	1	Gondola	41–0	City	Brill	Co. Shops
Connecticut Co	89	Open	....	City	Std.	Osg.-Brad.
	91	Closed	40–0	City	Std.	Osg.-Brad
	1	Closed	43–0	City	Std.	Wason
	20	Closed	40–0	City	Std.	Wason
	1	Closed	38–0	City	Brill	Brill
	6	Express	41–0	Int.	Std.	Wason
	2	Snow Plow	41–0	Int.	Was.	Wason
	7	Snow Plow	47–0	Int.	Was.	Wason
	2	Sweeper	28–3	City	Mc.-C.	McGuire-C
Corpus Christi St. & Int. Ry	1	Open	40–0	Both	Tay.	Southern
Cumberland Elec. Ry	2	Closed	32–0	City	Std.	Stephenson
Cumberland Ry	2	Comb.	41–0	Int.	Brill	Brill
Danbury & Bethel St. Ry	2	Open	41–8	City	Brill	Brill
	3	Closed	39–5	City	Brill	Brill
Dayton St. Ry	7	Conv.	31–4	City	B.&S.	Barney & Smith
Denver City Tramway	27	Closed	43–10	City	Brill	Woeber
	10	Trailer, C.	38–1	City	Woeb.	Woeber

Purchaser	No.	Class	Length	Serv.	Truck	Builder
Des Moines City Ry.	1	Sweeper	28–3	City	Mc.-C.	Mc-Guire-C
Detroit United Ry	50	Closed	42–3	City	Std.	Kuhlman
	25	Closed	42–3	City	Std.	Niles
	10	Closed	52–8	Int.	Bald.	Niles
	4	Closed	46–4	Int.	Bald.	Niles
	5	Express	50–0	Int.	Bald.	Niles
Dominion P. & Trans. Co.	9	Closed*	43–0	City	Brill	Ottawa
	3	Closed	55–0	Int.	Bald.	Preston
East St. Louis Ry	6	Closed*	45–0	City	Brill	American
	1	Swp.,Wk.	39–8	Both	Mc.-C.	McGuire-C.
East Shore & Suburban Ry.	3	Closed.	48–0	City	Brill	Danville
	2	Closed	36–0	City	Brill	American
Edmonton St. Ry	16	Closed*	42–0	City	Brill	Ottawa
	4	Semiconv.*	46–0	City	Brill	Preston
	1	Sweeper	30–0	City	Otta	Ottawa
Elmira Wtr., Lt. & R.R. Co.	6	Closed*	32–0	City	Brill	Brill
El Paso Elec. Co	6	Closed	21–0	City	.....	Cincinnati
Emigration Canyon R R	2	Trailer, C.	38–1	Int.	Brill	American
	1	Elec.Loco.	28–2	Freight	Bald	West.
Enid City Ry.	4	Closed	31–4	City	B.&S.	Bar.&Smith
Ft. Dodge, Des Mo. &So.RR.	2	Elec.Loco.	....	Freight	Bald.	Baldwin
Evansville Rys	1	Flat	40–0	City	Dor.	Co. Shops
	1	Stock	34–0	City	.....	Interstate
Evansville & So. Ind. Tr. Co.	1	Sweeper	53–0	City	Mc.-C.	McGuire-C.
	1	Elec.Loco	20–0	Yard	Co.	Co. Shops
Fairmont & Clarksburg Tr. Co.	1	Steel	34–0	City	Mc.-C.	McGuire-C.
	4	Closed	44–0	Int.	.....	Jewett
	6	Closed	30–0	City	Brill	Jewett
	4	Comb.	34–4	Int.	Brill	Kuhlman
	2	Express	45–0	Int.	Brill	Kuhlman
Fairmont & Mannington R.R.	6	Open	40–6	Both	Brill	Kuhlman
	1	Express	44–0	Int.	Brill	Kuhlman
Fonda, Johnst'n & Glov. R.R.	2	Comb.	29–0	Int.	Tay.	Brill
Fort Dodge, Des Moines & Southern R. R	1	Lococrane	....	Int.	.....	Browning
	2	Elec.Loco.	....	Int.	Bald	West.
Ft. Scott Gas & Elec. Co.	1	Closed	33–0	City	Brill	American
Ft. Smith Lt. & Trac. Co.	8	Semiconv.	31–8	City	Brill	Danville
Frederick R R	4	Open	22–0	City	Peck	Co. Shops
	1	Semiconv.	46–1	Int.	Brill	Brill
	1	Semiconv.	41–1	Int.	Brill	Brill
	1	Elec.Loco.	23–0	Freight	Bald.	West
Freeport Ry., Lt. & P. Co.	6	Closed	22–0	City	Brill	Brill
	2	Closed	30–0	City	St.L.	St. Louis
Galt,Prest.& Hespeler St.Ry.	2	Closed	54–0	Int.	Bald.	Preston
	1	Elec.Loco.	41–0	Freight	Bald.	West.
Galveston Elec. Co.	3	Closed	28–10	City	Brill	Kuhlman
	5	Open	....	City	.....	St. Louis
Galveston-Houston Elec. Ry.	10	Closed	52–0	Int.	Bald.	Cincinnati
	2	Express	52–0	Int.	Bald.	Cincinnati
Gary & Interurban Ry.	8	Closed	44–0	Int.	Mc.-C.	McGuire-C.
	4	Trail	....	Int.	Mc.-C.	McGuire-C.
	2	Work	20–0	Int.	Mc.-C.	McGuire-C.
	1	Sweeper	28–3	Int.	Mc.-C.	McGuire-C.
Georgia Ry. & Elec. Co.	6	Closed	30–0	City	Balt.	Co. Shops
	6	Closed	38–0	City	Brill	Co. Shops
	4	Closed*	42–0	City	Brill	Co. Shops
Gettysburg Ry.	1	Closed	16–0	City	Peck	Stephenson
Goldsboro Trac. Co.	1	Open	26–0	City	.....	.....
	2	Closed	22–0	City	.....	.....
Gr. Junc. & Gr. R. Val. Ry	3	Closed	50–0	Int.	Brill	Woeber
	1	Elec.Loco.	36–0	Int.	Brill	Woeber
Grand Rapids (Mich.) Ry.	12	Closed*	46–4	City	Brill	American
Granite City Ry	4	Closed	37–0	City	Mc.-C.	St. Louis
Great Falls St. Ry	2	Open	28–3	City	Mc.-C.	Danville
	2	Closed	29–11	City	Mc.-C.	Danville
	1	Sweeper	28–3	City	Mc.-C.	McGuire-C.
Greenville Trac. Co.	7	Closed	....	City	.....	St. Louis
Han. & McSherryst'n St.Ry.	2	Dump,Wk.	34–0	City	Co.	Co. Shops
Hartford & Springfield St.Ry.	1	SnowPlow	41–0	Int.	Was.	Wason
Holton Interurban Ry.	1	Comb.	44–0	Int.	Brill	Holman
Holyoke St. Ry.	4	Closed	42–0	City	Tay.	Wason
	1	Plow	47–0	City	Was.	Wason
Houghton County Trac. Co.	2	Closed	41–7	City	Brill	Kuhlman
Houston Elec. Co	15	Closed*	38–6	City	Brill	American
	10	Semiconv.*	31–0	City	Brill	Cincinnati
	5	Semiconv.*	41–0	City	Std.	Cincinnati
	1	Work	35–0	City	Std.	Co. Shops
	1	Wreck	23–0	Citv	Balt.	Co. Shops
	1	Dump	25–0	City	.....	Rodgers
Hudson & Manhattan R.R.	50	Closed	48–2	Tunnel	Bald.	A. C. & F
	30	Closed	48–2	Tunnel	Bald.	Pressed Stl
Hull Elec. Co.	3	Semiconv.	49–10	Int.	Brill	Preston
Humboldt Transit Co.	4	Comb.	33–0	City	Std.	Holman
Hummelst'n & Camp. St. Ry.	1	Semiconv.	41–0	Int.	Brill	Brill
Hutchinson Interurban R.R.	1	Closed*	32–7	City	Brill	Danville
Illinois Trac. System	31	Closed*	33–8	City	Curtis	Danville
	10	Closed	55–6	Int.	Bald.	Danville
	1	Office	54–6	Int.	.....	A. C. & F.
	4	Comb.	52–6	Int.	Curtis	McGuire-C.
	5	Par.Obser.	55–6	Int.	AC&F	Danville
	2	Sleeper	57–0	Int.	B.&S.	Bar.-Smith
	2	Ex-Trail.	....	Int.	Co.	Co. Shops
	4	Express	55–6	Int.	Curtis	McGuire-C.
	35	Ex-Trail.	41–5	Int.	Mc.-C.	McGuire-C.
	25	Frt., Box	....	Int.	.....	Haskell-B.
	50	Gondola	....	Int.	.....	Haskell-B.
	22	Coal	....	Int.	.....	Haskell-B.
	8	SnowPlow	....	Int.	Co.	Co. Shops
	4	Sweeper	28–3	City	.....	McGuire-C.
	6	Elec.Loco.	34–0	Int.	A.L.C.	Co. Shops
	4	Caboose	....	Int.	Co.	Co. Shops
	1	Coal Crane	....	.....	.....	Browning
	1	Wreck	....	Int.	.....	Browning
Ind'lis, Newc'tle & Tol. El.Ry.	4	Flat	36–0	Constr.	.....	Interstate
	1	Dump	34–0	Constr.	....	Interstate
Indianapolis Trac. & Ter. Co.	25	Closed	33–2	City	Std.	Cincinnati
Interborough R. T. Co.	75	Motor	47–0	Sub.	Std.	Pressed Stl.
	40	Trail	47–0	Elev.	Brill	Wason
	40	Motor	47–0	Elev.	Brill	Jewett
	20	Motor	47–0	Elev.	Brill	Cincinnati
	1	Sweeper	28–3	City	Mc.-C.	McGuire-C.
Interurban Construction Co.	3	Closed	....	Int.	.....	St. Louis
	1	Express	....	Int.	.....	St. Louis
Inter-Urban Ry.	16	Gondola	....	Int.	.....	.....
Interurban Ry. & Ter. Co.	21	Sweeper	28–3	Both	Mc.-C.	McGuire-C.
Jacksonville Elec. Co.	10	Closed*	39–1	City	Std.	Cincinnati
Jersey Central Trac. Co.	8	Semiconv.	42–9	Int.	Brill	Brill
	10	Dump	....	Int.	.....	Kilbourne & J.

Purchaser	No.	Class	Length	Serv.	Truck	Builder
Kankakee Elec. Ry.	2	Closed	....	City	.....	St. Louis
Kan.City, Lawr.& Top. El.R.R.	4	Closed	40–0	Both	St.L.	St. Louis
Knoxville Ry. & Lt. Co.	10	Closed	33–8	City	Balt.	McGuire-C.
La Crosse City Ry.	2	Semiconv.	32–0	City	Brill	American
L. Char. Ry.,Lt.& Wtr.W.Co.	4	Semiconv.	30–1	City	Brill	American
Lawton & Ft. Sill Elec. Ry.	1	Closed	24–0	City	Brill	Wason
	1	Comp., C.	57–0	City	A.L.C.	Wason
Lawrence Ry. & Lt. Co.	3	Closed*	31–0	City	Brill	St. Louis
Lehigh Valley Transit Co.	10	Closed*	41–9	Int.	Brill	Brill
	1	Comb.	40–0	Int.	Brill	Brill
	1	SnowPlow	32–0	Int.	.....	Russell
	5	Sweeper	....	City	Brill	Brill
Lexington & Interurban Rys.	5	Semiconv.	30–1	Both	Brill	Brill
	4	Semiconv.	55–0	Both	Brill	Brill
	1	Sweeper	28–3	City	Mc.-C.	McGuire-C.
Lincoln Trac. Co.	1	Elec.Loco.	40–0	Both	Tay.	Co. Shops
Linwood St Ry.	1	Closed	38–0	City	.....	Wason
Little Rock Ry. & Elec. Co.	7	Semiconv.	44–0	City	St.L.	Co. Shops
London St. Ry.	1	Sweeper	28–3	City	.....	Ottawa
Long Island R.R.	100	Closed stl.	63–5	Int.	.....	A. C. & F.
	6	Closed*	33–4	City	Brill	Brill
	15	Comb.stl.	63–5	Int.	.....	A. C. & F.
	25	Exp stl.	63–5	Int.	.....	A. C .& F
Los Angeles Ry.	300	Cal.	44–7	City	Co.	St. Louis
Los Angeles & Redondo Ry.	10	Open	48–4	Int.	Co.	Co. Shops
	1	Elec.Loco.	30–0	Int.	Co.	Co. Shop
Lynchburg Trac. & Lt. Co.	4	Semiconv.*	40–0	City	Brill	Brill
Macon Ry. & Lt. Co.	8	Closed*	42–0	City	Brill	Brill
Mah'g & Shen'go Ry.&Lt.Co.	12	Closed	42–4	City	.....	Niles
	6	Closed	50–10	Int.	.....	Niles
Marion, Bluffton & E. Tr. Co.	1	Conv.	52–0	Both	Tay.	Cincinnati
Meridian Lt. & Ry. Co.	4	Conv.	51–0	City	Balt.	Southern
Metropolitan St. Ry.	25	Closed*	47–2	City	Std.	Cincinnati
	25	Closed*	41–3	City	Std.	Co. Shops
Michigan United Rys.	30	Closed	41–0	City	Brill	Brill
	8	Closed	28–0	City	Brill	Kuhlman
	2	Ex-Trail.	40–0	Int.	Mc.-C.	McGuire-C.
	1	Comb.	58–6	Int.	Mc.-C.	McGuire-C.
	1	Special	....	Int.	Mc.-C.	McGuire-C.
	2	Swp.& Ex.	28–3	City	Mc.-C.	McGuire-C.
	2	Swp.& Ex.	39–8	Int.	Mc.-C.	McGuire-C.
	1	SnowPlow	50–0	Int.	Mc.-C.	McGuire-C.
	1	Sprinkler	....	City	Mc.-C.	McGuire-C.
Minn.,St.P.,Roch.&Dub.T.Co.	4	Trail, C.	44–0	Int.	Brill	Brill
	2	Gas.Elec.	60–0	Int.	A.L.C.	Wason
	10	Flat	....	Int	.....	.....
Missoula St. Ry.	7	Semiconv.*	38–0	City	Brill	American
	2	Trailer, O.	42–0	City	Brill	Brill
	1	Work	36–0	City	Brill	American
	1	Sweeper	....	City	Brill	Brill
Mobile Lt. & R.R. Co.	3	Trailer, O.	31–0	City	Tay.	Co. Shops
Mont. & South. Cos. Ry.	2	Trailer, C.	49–8	Int.	Curtis	Co. Shops
	1	Plow	35–0	Int.	Peck	.....
Montreal St. Ry.	50	Semiconv.*	47–0	City	.....	Ottawa
	2	Trailer, O.	49–6	Sub.	Brill	Preston
	3	Trailer, C.	38–0	Int.	.....	Ottawa
	25	Dump	....	Int.	.....	Canadian
Moose Jaw Elec. Ry.	6	Closed	31–0	City	Brill	Ottawa
Morris Co. Trac. Co.	5	Semiconv.	38–0	City	Brill	Stephenson
Municipal St. Ry.	1	Closed	32–0	City	Brill	American
	2	Trailer, C.	30–0	City	.....	.....
Nashville Ry. & Lt Co.	12	Closed	33–4	City	Brill	Co. Shops
Nelson St. Ry.	2	Closed*	41–6	City	Brill	Ottawa
New Orleans Ry. & Lt. Co.	50	Closed*	32–8	City	Balt.	St. Louis
NewPaltz, High. & P. Tr. Co.	1	Open	28–8	City	.....	Brill
N.Y., N.H. & H.R.R.(el.div.).	4	Closed M.	70–10	T. Line	Std.	Standard
	12	Trailer, C.	70–10	T. Line	Std.	Standard
	1	Elec.Loco.	37–0	Switch	Bald.	West.
	1	Elec.Loco.	48–0	Freight	Bald.	West.
	1	Elec.Loco.	53–3	Freight	Bald.	West.
New York & N. Shore Tr. Co.	2	Semiconv.*	30–8	City	Brill	Kuhlman
	4	Semiconv.	33–4	City	Brill	Kuhlman
	1	Sweeper	....	City	Brill	Brill
New York & Queens Co. Ry.	25	Closed	41–0	Both	Std.	Jewett
New York State Rys.	25	Semiconv.*	31–0	City	Brill	Kuhlman
	2	Sweeper	28–3	Both	Mc.-C.	McGuire-C.
Nipissing Central Ry.	4	Closed	40–0	Int.	Bemis	Preston
Norfolk & Bristol St. Ry.	1	Semiconv.	41–10	Int.	Std.	Southern
	1	SnowPlow	41–4	Int.	Was.	Wason
Norfolk City & Suburban Ry.	2	Closed*	42–0	Int.	Brill	Brill
Norfolk & Portsmouth Tr.Co.	8	Semiconv.*	42–8	City	Brill	Brill
Northampton St. Ry.	1	Closed	42–8	City	Was.	Wason
	3	Closed	39–0	City	Tay.	Wason
	1	Plow	47–0	Sub.	Was.	Wason
Northampton Trac. Co.	2	Open	43–0	Both	Was.	Wason
	2	Closed	40–3	Both	Was.	Wason
Northern Ohio Trac. & Lt. Co.	14	Closed	41–10	Int.	Brill	Kuhlman
	4	Closed	22–6	City	Brill	Kuhlman
	10	Semiconv.	30–8	City	Brill	Kuhlman
	13	Conv.	35–6	City	Brill	Kuhlman
	1	Work	50–0	City	Peck	Co. Shops
Northern Illinois Elec. Ry.	2	Closed	31–0	City	Brill	American
Northern Texas Trac. Co.	15	Closed*	39–0	City	Brill	American
	1	Closed	52–0	Int.	Bald.	Cincinnati
	4	Closed	40–0	Int.	.....	Kuhlman
	7	Trailer, C.	40–8	City	Brill	American
	1	Express	50–0	Int.	Brill	Co. Shops
	1	Work	40–0	Int.	Brill	Co. Shops
North Jersey R T. Co.	6	Closed	42–0	Int.	Bald.	Jewett
	1	Wk. & Pl.	40–0	City	Mc.-C.	McGuire-C.
	1	Flat	....	City	.....	.....
	3	Ballast	30–0	Int.	.....	Wes. Wheel
Oak Bluffs St. Ry.	2	Open	....	City	Bemis	Jones
Oakland & Antioch Ry.	2	Open	45–0	Int.	Brill	Holman
Oakland Trac. Co.	60	Closed*	....	City	Brill	St. Louis
Oakwood St. Ry.	2	Closed	....	City	.....	McGuire-C.
Ogden R. T. Co.	2	Semiconv.	46–0	Both	St.L.	St. Louis
	3	Trailer, C.	38–0	Both	Brill	American
	4	Comb.	48–0	Both	St.L.	St. Louis
	5	Flat	36–0	Both	.....	.....
	4	Dump	.....	.....	.....	.....
	1	Elec.Loco.	....	Int.	St.L.	St. Louis
Ohio Elec. Ry.	10	Closed	61–6	Int.	Tay.	Cincinnati
	8	Closed	27–6	City	Ellio.	Cincinnati
	14	Semiconv.	20–8	City	Ellio.	Cincinnati
	6	Express	50–0	Int.	Tay.	Cincinnati
	8	Ex-Trail.	40–0	Int.	Std.	Cincinnati
	2	Sweeper	28–3	Int.	Mc.-C.	McGuire-C.
Ohio & Southern Trac. Co.	1	Closed	52–6	Int.	Mc.-C.	McGuire-C
Ohio Valley Elec. Ry.	3	Closed	39–0	Int.	Jew.	Jewett

Purchaser	No.	Class	Length	Serv.	Truck	Builder
Oklahoma Inter. Trac. Co.	1	Closed	24–0	City	Brill	Brill
Oklahoma Ry.	6	Closed	45–0	Int.	.....	Niles
	4	Comb.	30–0	Int.	Brill	Danville
Old Colony St. Ry.	8	Open	40–11	Both	Std.	Stephenson
	8	Open	35–6	Both	Std.	Stephenson
	4	Express	39–0	Both	Std.	Laconia
	2	Work	35–0	Both	Std.	Smith & W.
	4	SnowPlow	47–0	Both	Was.	Wason
	1	SnowPlow	29–6	Both	Rus.	Russell
Omaha&Council Bluffs St.Ry.	25	Closed*	42–0	City	Brill	American
	2	Work	....	City	.....	.....
	2	Flat	....	City	.....	.....
	1	Lococane	....	City	.....	Browning
	1	Sweeper	28–3	City	Mc.-C.	McGuire-C.
Oneida Ry.	1	SnowPlow	....	Int.	Rus.	Russell
Ont. & San Ant. Hghts R.R.	3	Closed	20–4	City	Brill	Kuhlman
Oregon Elec. Ry.	2	Observ.	61–2	Int.	Bald.	Niles
	4	Trailer, C.	62–0	Int.	Bald.	Niles
	3	Comb.	57–8	Int.	Bald.	Niles
	10	Frt., Box	40–0	Int.	Bald.	Seattle
	15	Flat	36–0	Int.	Bald.	Seattle
	10	Gondola	41–0	Int.	Bald.	Seattle
	2	Elec.Loco.	34–0	Int.	A.L.C.	Gen. Elec.
Ottawa Elec. Ry.	18	Semiconv.*	45–6	Both	Brill	Ottawa
Pawcatuck Valley St. Ry.	4	Open	....	City	Brill	Stephenson
	2	Closed	28–0	City	Brill	Brill
Peekskill Ltg. & R.R. Co.	1	Semiconv.	30–1	City	Brill	Brill
Pennsylvania Tun.&Ter.R.R.	2	SnowPlow	....	Int.	Rus.	Russell
Peoples Ry., Wilmington	1	Comb.	30–0	City	Rus.	Russell
Peoria Ry. Terminal Co.	5	Comb.	56–0	Int.	Mc.-C.	McGuire-C.
	1	Pl.& Loco.	....	Int.	.....	.....
Philadelphia R. T. Co.	35	Closed	49–7	Elev.	Brill	Pressed Stl.
	10	Closed*	34–0	City	Brill	Co. Shops
	9	Express	33–2	City	Brill	Co. Shops
	3	City Ash	33–6	City	Brill	Brill
Phila. & West Ches. Trac. Co.	1	SnowPlow	43–6	Int.	...	Smith & W.
Pittsb ,Har.,But. & N.C. Ry.	2	Closed	....	Int.	.....	Standard
Pitts.,McKeespt.&W'l'd Ry.	1	Closed	33–0	Both	Peck	Co. Shops
	1	Comb.	34–0	Both	Peck	Co. Shops
	1	Coal	20–0	Both	Peck	Co. Shops
Pittsburgh Rys.	50	Trailer, C.*	45–0	City	Std.	Standard
	50	Closed*	46–8	City	Std.	Pressed Stl.
	3	Frt., Box	45–0	Int.	Brill	Kuhlman
Pittsfield Elec. St. Ry.	1	Open	42–6	City	Was.	Wason
	2	Closed	....	City	.....	Jones
Pt.Arthur & Ft.Will. Elec.Ry.	2	Semiconv.	46–0	City	.....	Ottawa
	8	Semiconv.	46–0	Int.	Brill	Preston
	2	Semiconv.	46–0	Int.	Curtis	Preston
Port Jervis Trac. Co.	1	Sweeper	....	City	Brill	Brill
Portland (Maine) R.R.	2	Open	35–11	City	Brill	Brill
	3	Closed	38–0	City	Brill	Brill
	2	Closed	....	City	Co.	Co. Shops
Portland Ry., Lt. & P. Co.	65	Closed*	45–0	City	Brill	American
	57	Closed	47–10	City	Brill	American
	6	Closed	51–2	Int.	Brill	Co. Shops
	1	Exp.& Ml.	48–0	Int.	Bald.	Co. Shops
	15	Flat	41–0	Int.	.....	Seattle
	10	Flat	45–0	Int.	.....	Seattle
	10	Ballast	36–0	Int.	.....	Rodgers
	3	Elec.Loco.	37–6	Int.	Bald.	Co. Shops
Pough. & Wapp'r's Fls.El.Ry.	2	Semiconv.	27–8	City	Brill	Brill
Public Service Ry.	100	Closed*..	44–0	City	Brill	Cincinnati
	10	Closed...	46–4	City	Brill	Co. Shops
Puget Sound Elec. Ry.	1	Closed ...	56–0	Int.	Bald.	Cincinnati
	1	Parlor	58–6	Int.	Bald.	Cincinnati
Quebec Ry., Lt. & P. Co.	16	Closed*	30–0	City	Tay.	Ottawa
	2	Closed	60–0	Int.	Tay.	Ottawa
	2	Dump	33–0	Cons.	Co.	Canadian
	2	SnowPlow	23–4	City	Co.	Ottawa
	2	Sweeper	27–0	City	Co.	Ottawa
	1	Sprinkler	27–0	City	Mc.-C.	McGuire-C.
Reading Transit Co.	10	Semiconv.*	41–6	City	Brill	Brill
Rhode Island Co.	31	Open	....	City	Std.	Osg.-Brad.
	50	Closed	30–0	City	Std.	Osg.-Brad.
Richmond & Henrico Ry.	12	Closed*	47–0	Both	Brill	Brill
Riverside Trac. Co.	1	SnowPlow	....	Int.	Brill	Brill
	1	Sweeper	28–3	City	Mc.-C.	McGuire-C.
Roanoke Gas & Water Co.	2	Open	....	Incline	Brill	Stephenson
Roanoke Ry. & Elec. Co.	4	Semiconv.*	40–0	City	Brill	Brill
	1	Sweeper	28–3	City	Mc.-C.	McGuire-C.
Roch., Syr. & East. R.R.	13	Closed	42–10	Int.	Bald.	Kuhlman
	1	Comb.	30–0	Int.	Rus.	Russell
	1	Private	55–0	Int.	Bald.	Kuhlman
Rockford & Interurban Ry.	4	Closed	31–6	City	Brill	Kuhlman
	2	Closed*	41–0	City	Brill	Kuhlman
Rock Island Southern R.R.	2	Semiconv.	62–2	Int.	Bald.	St. Louis
	2	Trailer, C.	62–2	Int.	Bald.	St. Louis
	2	Comb.	62–2	Int.	Bald.	St. Louis
	2	Express	62–2	Int.	Bald.	St. Louis
Rock., Thom. & Cam. St. Ry.	2	Semiconv.	40–10	Both	Tay.	Laconia
Rome Ry. & Lt. Co.	2	Closed	30–6	City	Balt.	Southern
St. Joseph Ry., Lt. & P. Co.	5	Closed*	44–0	City	Brill	American
	1	Sweeper	28–3	City	Mc.-C.	McGuire-C.
St. Jos. & Savannah Int. Ry.	3	Closed	44–0	Int.	Brill	American
St. Louis Water Works	1	Closed	32–0	Int.	Brill	American
Saginaw Bay City Ry.	6	Closed*	28–0	City	Brill	Kuhlman
Salt Lake & Ogden Ry.	10	Comb.	56–0	Int.	Bald.	Jewett
San Antonio Trac. Co.	10	Semiconv.*	38–0	City	Brill	American
San Diego Elec. Ry.	12	Comb.	40–0	City	Brill	Co. Shops
Sandpoint & Int. Ry. Co.,Ltd.	1	Open	....	Int.	.....	.....
	2	Closed	....	Int.	.....	.....
	1	Trailer, O.	....	Int.	.....	.....
San Juan Light & Transit Co.	10	Open	30–0	City	Brill	Brill
	1	Comb.	....	Int.	.....	A. C. & F.
	50	Flat	....	Int.	.....	Magor
	4	Dump	....	Int.	.....	Canadian
Savannah Elec. Co.	2	Semiconv.	32–0	City	St.L.	Co. Shops
Schuylkill & Dauphin Trac.Co.	1	Gas.Mot.	27–0	Int.	Brill	Brill
Scioto Valley Trac. Co.	1	Frt., Box	36–0	Int.	B.&S.	Bar.&Smith
Seattle-Everett Trac. Co.	6	Closed	52–0	Int.	Bald.	Niles
	6	Flat	36–0	Int.	Seat.	Seattle
Selma St. & Inter. Ry.	2	Closed	36–0	City	Brill	Brill
Sheboygan Ry. & Elec. Co.	2	Comb.	50–0	Int.	.....	Cincinnati
	1	SnowPlow	....	Int.	.....	Russell
Sherbrooke Ry. & Pwr. Co.	2	Closed*	31–0	City	Brill	Ottawa
	1	Sweeper	30–0	City	.....	Ottawa
Shore Line Elec. Ry.	10	Closed	40–6	Int.	Bald.	Jewett
	2	Closed	28–0	City	Bald.	Jewett
	3	Flat	30–0	Freight	Brill	Brill
	1	Snow Plow	36–0	Both	S.&W.	Smith & W.
Shreveport Trac. Co.	5	Closed	30–1	City	Brill	American
Sioux Falls Trac. System.	1	Sweeper	22–0	City	Mc-C.	McGuire-C.
South Bethlehem & Saucon St. Ry.	2	Open	30–0	Both	Peck	Brill
	2	Closed	30–0	Both	.....	American
	1	Snow Plow	....	Both	Was	Wason
Southern Pacific Co.	40	Closed	72–4	Int.	Bald.	A. C. & F.
	60	Trailer, C.	72–4	Int.	Bald.	A. C. & F.
	25	Comb.	72–4	Int.	Bald.	A. C. & F.
Southern Wisconsin Ry.	4	Semiconv.	31–2	City	Brill	American
Southwest Missouri R.R.	4	Open	45–0	Int.	Tay.	Co. Shops
	4	Closed	45–0	Int	Tay.	Co. Shops
South Morgantown Trac. Co.	2	Semiconv.	40–1	City	Brill	Kuhlman
Spokane & Inland Emp. R.R.	10	Closed	41–1	City	Brill	St. Louis
	2	Elec.Loco.	38–5	Freight	Bald.	West.
Springfield Consol. Ry.	5	Closed*	33–6	City	Brill	Kuhlman
Springfield (Mass.)St. Ry.	12	Open	39–6	City	Std.	Wason
	6	Closed	40–11	City	Std.	Osg.-Brad
	8	Closed	40–11	City	Std.	Wason
	5	Express	41–2	Both	Std.	.....
	2	Gondola	40–6	Both	.....	.....
Springfield Trac. Co.	4	Closed	30–8	City	Brill	American
	3	Trailer, O.	37–11	City	Brill	Stephenson
	1	Sweeper	28–3	City	Mc.-C	McGuire-C.
Springfield, Troy & Piqua Ry.	3	Frt., Box	39–0	Int.	.....	.....
Syra., Lakeshore & Nor. R.R.	5	Closed	52–0	Int.	Bald.	Kuhlman
Syracuse Rapid Trans. Ry.	23	Semicn.*	30–11	City	Brill	Kuhlman
Taylorville Ry.,Lt.Ht.& P. Co.	2	Open	30–0	City	Brill	American
	2	Closed	30–0	City	Brill	American
	2	Coal	....	City	.....	.....
Terre H.,Ind. & Eas. Trac. Co.	6	Closed	....	Int.	Std.	Co. Shops
	1	Closed	22–0	City	Std.	Cincinnati
	1	Special	....	Int.	.....	Cincinnati
	1	Express	50–0	Int.	.....	Cincinnati
Texarkana Gas. & Elec. Co.	1	Semiconv.	30–1	City	Brill	Danville
	1	Work	34–0	City	Mc.-C.	McGuire-C.
	2	Work	16–0	City	Mc.-C.	McGuire-C.
Third Avenue R.R.	30	Stor. Bat.	27–1	City	Co.	Co. Shops
	1	Derrick	40–10	City	Mc.-C.	McGuire-C
	3	Sweeper	28–6	City	Brill	Brill
Toledo Rys. & Lt. Co.	20	Semiconv.*	30–8	City	Brill	Kuhlman
Topeka Ry.	6	Closed	....	City	Curtis	Danville
Toronto Ry.	50	Conv.*	44–9	City	Curtis	Co. Shops
Toronto Suburban Ry.	2	Semiconv.*	46–0	Int.	Brill	Preston
Trans-St. Mary's Trac. Co.	2	Trailer, O.	26–0	City	Brill	Brill
Trenton St. Ry.	10	Closed*	41–6	City	Brill	Brill
Tri-City Ry.	15	Closed*	44–8	City	Std.	Cincinnati
Tulsa St. Ry.	4	Semiconv.	31–4	City	B.&S.	Bar.& Smith
Twin City Lt. & Trac. Co.	2	Closed	40–0	Int.	Bald.	Niles
	1	Express	40–0	Int.	Bald.	.....
Twin City R. T. Co.	75	Closed	46–8	Both	Co.	Co. Shops
	3	SnowPlow	44–0	Both	Co.	Co. Shops
Union Ry.	100	Semiconv.*	43–0	City	Brill	Brill
	3	Sweeper.	28–6	City	Brill	Brill
Union St. Ry.	12	Open	30–0	City	Std	Bradley
	12	Closed	28–0	City	Std.	Jones
Union Trac. Co., Sistersville.	1	Open	42–0	City	Jew.	Jewett
	2	Closed	45–0	City	Jew.	Jewett
Union Traction Co.	1	Closed	36–4	City	Brill	Danville
	3	Semiconv.	30–1	City	Brill	Danville
	1	Semiconv.	30–1	City	Brill	American
Unit'd Railr'ds, San Francisco	80	Closed*	47–0	City	Std.	Jewett
United Rys. Co, St. Louis	25	Semiconv.*	48–0	City	Co.	Co. Shops
United Rys., Portland.	1	Closed	46–10	Int.	.....	Brill
	1	Comb.	51–6	Int.	.....	Brill
United Rys. & Elec. Co. Balt.	60	Closed*	42–1	City	Brill	Brill
Utah Lt. & Ry. Co.	12	Semiconv.	....	City	Std.	St. Louis
	12	Semiconv.	45–5	Int.	Std.	St. Louis
Vancouver Trac. Co.	1	Semiconv.	38–0	City	Brill	American
Virginia Ry. & Pwr. Co.	20	Closed*	44–11	City	Brill	Brill
Visalia Elec. R. R.	2	Closed	57–3	Int.	Bald.	Moran
Wahpeton-Breckenr'ge St.Ry.	2	Closed	30–0	Both	Mc.-C.	McGuire-C.
Warren-Bisbee Ry.	2	Trailer, O.	....	Int.	Mc.-C.	McGuire-C.
Wash., Balt. & Annap's Ry.	10	Pass.	50–0	Int.	Bald.	Niles
Washington Ry. & Elec. Co.	50	Closed*	41–1	City	Brill	Brill
	1	Comb.	35–0	City	Brill	Brill
Washington Wtr. Pwr. Co.	25	Closed*	51–0	City	Brill	Brill
Waterloo,Cedar Fls.&No.Ry.	2	Open	....	City	Mc.-C.	McGuire-C.
	6	Closed	28–11	City	Mc.-C.	McGuire-C.
	3	Comb	57–2	Int.	Mc.-C.	McGuire-C.
	35	Flat	36–0	Int.	.....	Hicks
	1	Sweeper	28–3	City	Mc.-C.	McGuire-C.
	1	Elec.Loco.	....	Int.	Co.	Co. Shops
Westchester Elec. R.R.	1	Sweeper	28–6	Both	Brill	Brill
Western Ohio Ry.	8	Gondola	....	Int.	.....	Hicks
West Penn. Rys.	1	Closed	56–8	Int.	.....	Cincinnati
Whatcom Co. Ry. & Lt. Co.	3	Closed*	47–0	City	Std.	American
Wheeling Trac. Co.	8	Semiconv	30–0	City	Brill	Kuhlman
Wichita Falls Traction Co.	4	Closed*	34–0	City	Brill	American
	4	Trailer, C.*	60–0	City	Brill	Danville
Wichita R.R. & Lt. Co.	4	Open	42–0	City	Brill	American
	4	Closed	42–0	City	Brill	American
	4	Trailer, O.	42–0	City	Brill	Danville
	1	Sweeper	28–3	City	Mc.-C.	McGuire-C.
Wilkesbarre Ry.	1	Sweeper	....	City	Brill	Brill
Winnipeg Elec. Ry.	8	Dump	....	Both	.....	Canadian
	3	Sweeper	28–3	Both	Mc.-C.	McGuire-C.
Winona Interurban Ry.	6	Open	....	Int.	Tay.	Jewett
	5	Comb.	57–8	Int.	Bald.	Jewett
	1	Express	60–0	Int.	Bald.	Jewett
	1	Work Line	....	Int.	Peck	Co. Shops
	2	Frt., Box	....	Int.	Std.	Hicks
	2	Stock	....	Int.	Std.	Hicks
	2	Frt.Trailer	....	Int.	Tay.	Co. Shops
	1	Elec.Loco.	....	Int.	Bald.	Co. Shops
Winona Ry. & Lt. Co.	2	Semiconv.	18–0	City	Brill	Stephenson
Woodstock & Svca. Trac. Co.	1	Gas. Mot.	55–0	Int.	McK.	McKeen
Worcester Consol. St. Ry.	15	Open	....	City	Std.	Osg.-Brad.
	14	Closed	28–0	City	Std.	Osg.-Brad
	2	SnowPlow	47–0	City	Was.	Wason
Yakima Valley Transpor.Co.	1	Closed	34–0	Int.	Brill	Brill
	1	Closed	43–8	Int.	Std.	Niles
	2	Closed	32–0	City	Brill	Stephenson
	2	Closed	29–5	City	Brill	American
	1	Conv.	43–0	Both	Brill	American
	1	Gas. Mot.	....	Int.	McK.	McKeen
	12	Gondola	42–0	Int.	Seat.	Seattle
Yonkers Ry.	1	Sprinkler	....	City	Brill	Brill
York Rys.	1	Sweeper	28–6	City	Brill	Brill

NEW ELECTRIC RAILWAY TRACK CONSTRUCTION IN 1910

The accompanying table shows in detail the new electric railway track mileage built and opened for operation during the year 1910 in the United Statess and Canada. The table has been compiled from answers received from the railway companies whose names appear so that the mileage given in each instance is official. The only mileage represented in the table is track which was completed and placed in operation during the year. Of course, the table is not absolutely correct as far as the totals per state are concerned, since some companies did not reply in time for this compilation.

The total new mileage represented this year is 1397.26, as against 887.16 miles built in 1909 and 1258.51 built in 1908.

In the classification of mileage by states New York heads the list with 174.66 miles as against 129.08 miles in 1909; Illinois is second, with 139.56 miles as against 41.85 miles in 1909. The mileage in New York is made up largely of the Pennsylvania tunnels and the extension of the New York Central's electric zone to White Plains. No reports were received concerning new work by Mexican electric railways.

	Miles.
ALABAMA	
Birmingham & Edgewood Electric Ry	2.50
Birmingham Railway, Light & Power Co	2.00
Montgomery Traction Co.—Through Cloverdale	2.00
	6.50
ARKANSAS	
Fort Smith Light & Traction Co	2.00
Little Rock Railway & Electric Co	0.60
	2.60
CALIFORNIA	
Bakersfield & Kern Electric Ry	2.00
Bakersfield & Ventura R. R	5.00
East Shore & Suburban Ry	1.00
Monterey & Del Monte Heights Ry	3.00
San Diego Electric Co	2.50
Stockton, Terminal & Eastern R. R.—Between Stockton, Waterloo, Linden and Bellotta	17.00
United Railroads of San Francisco	1.40
Visalia Electric R. R	11.00
	42.90
COLORADO	
Colorado Railway, Light & Power Co	1.00
Colorado Springs & Interurban Ry	1.50
Denver & South Platte Ry.—South of Littleton	0.75
Denver & Interurban R. R.—From Westminster Station to Westminster University	1.82
Grand River Junction & Grand River Valley Ry.—Between Grand Junction and Fruita	17.00
Greeley & Denver R. R	6.00
	28.07
CONNECTICUT	
Connecticut Co.	4.84
Shore Line Electric Ry.—Between Ivoryton, Essex, Saybrook, Westbrook, Clinton, Madison, Guilford and Stony Creek	31.00
	35.84
DISTRICT OF COLUMBIA	
Washington Railway & Electric Co	1.19
Washington, Spa Springs & Gretta R. R.—Between Washington and Bladensburg	4.00
	5.19
GEORGIA	
Athens Electric Ry	2.48
City & Suburban Ry	2.00
Georgia Railway & Electric Co	10.00
Rome Railway & Light Co	0.13
	14.61
IDAHO	
Sandpoint & Interurban Railway Co., Ltd.—Between Ponderay and Kootenai	6.00
	6.00
ILLINOIS	
Aurora, Elgin & Chicago R. R	3.33
Calumet & South Chicago Ry.—In Chicago	1.21
Central Illinois Public Service Co.—In Charleston	1.00
Chicago, Aurora & DeKalb R. R.—Between Aurora, Kaneville, Maple Park, Cortland and DeKalb (electrified)	30.00
Chicago City Ry.—In Chicago	10.69
Chicago & Joliet Ry.—Turnouts on city lines	0.30
Chicago Railways	8.11
Dixon, Rock Falls & Southwestern Electric Ry.—Between Tampico, Yorktown and Hooppole	8.00
East St. Louis Ry	1.20
Illinois Central Electric Ry.—Between Norris and Fairview	7.22
Illinois Traction System—Belt Line near Granite City	2.50
Metropolitan West Side Elevated Ry.—Surface	1.00
Northern Illinois Electric Ry.—Between Amboy and Lee Center	6.00
North Kankakee Electric Light & Railway Co	2.00
Peoria Railway Terminal Co	4.60
Rock Island Southern Ry.—Between Monmouth and Galesburg—Electrified	19.20
Between Monmouth & Rock Island	31.00
Taylorville Railway, Light, Heat & Power Co	2.00
	139.36
INDIANA	
Beech Grove Traction Co.—Between Indianapolis and Beech Grove	4.30
Bluffton, Geneva & Celina Traction Co.—Between Bluffton, Vera Cruz, Linngrove and Geneva	18.50
Chicago, Lake Shore & South Bend Ry	10.00
Evansville Railways—Rockport to Grandview, Second track	6.75
Indianapolis, New Castle & Toledo Electric Ry.—Completed line, New Castle to Indianapolis	40.25
Winona Interurban Ry. Between Mentone and Chile	22.00
	101.80
IOWA	
Albia Interurban Ry	1.50
Cedar Rapids & Iowa City Ry	5.75
Centerville Light & Traction Co.—Between Centerville, Brazil and Mystic	6.60
Charles City Western Ry.—Between Charles City and Marble Rock	15.00
Fort Dodge, Des Moines & Southern R. R.—Electrified	17.00
Ottumwa Railway & Light Co	1.00
Sioux City Service Co	1.25
Tri-City Ry	3.00
Waterloo, Cedar Falls & Northern Ry	63.10
	63.10
KANSAS	
Arkansas Valley Interurban Ry.—From Wichita to Valley Center and Sedgwick	10.00
Atchison Railway, Light & Power Co	2.53
Joplin & Pittsburg Ry.—From Pittsburg to Frontenac	1.00
Lawrence Railway & Light Co	1.00
Manhattan City & Interurban Ry	1.50
Topeka Ry.—In Topeka	2.34
	18.37
KENTUCKY	
Lexington & Interuban Ry.—City	2.00
Interurban between Lexington and Nicholsville	12.00
Owensboro City R. R	2.00
	16.00
LOUISIANA	
New Orleans Railway & Light Co	6.00
	6.00
MAINE	
Aroostook Valley R. R.—Between Presque Isle and Washburn	2.20
	2.20
MARYLAND	
Cumberland Electric Ry	0.75
Frederick R. R	4.00
United Rys. & Elec. Co	0.66
	5.41
MASSACHUSETTS	
Berkshire Street Ry.—Between Great Barrington and So. Egremont	3.45
Boston & Northern Street Ry	6.80
Middlesex & Boston Street Ry	2.00
Old Colony Street Ry	2.00
Springfield Street Ry.—In Westfield	1.01
	15.26
MICHIGAN	
Benton Harbor, St. Joe Railway & Light Co.—Benton Harbor to Paw Paw Lake	15.00
Detroit River Tunnel Co.—Electrified	5.00
Detroit United Ry.—In Flint City	1.47
Escanaba Electric Street Ry.—Interurban between Wells and Gladstone	6.50
Grand Rapids Ry	0.13
Lansing & Northeastern Ry.—Between Haslett, Perry, Shaftsburg, Morrice and Owosso	23.00
Menonimee & Marinette Light & Traction Co	1.33
Twin City General Electric Co.—Toward Bessemer	1.50
	53.93
MINNESOTA	
Grand Forks Street Ry	2.00
Minneapolis, St. Paul, Rochester & Dubuque Traction Co.—Between Bloomington, Savage, Lakeville and Northfield	40.00
	42.00
MISSISSIPPI	
Gulfport & Mississippi Coast Traction Co.—Built into Pass Christian	7.20
Meridian Light & Railway Co	1.50
Summit & McComb Motor Line.—Between Summit, McComb and Godbold Wells	5.25
	13.95
MISSOURI	
Cape Girardeau-Jackson Interurban Ry	1.50
Illinois Traction System	6.00
Kansas City, Lawrence & Topeka Electric Ry.—Between Monrovia, Alden's Golf Club Grounds and Zarah	5.00
Metropolitan Street Ry	11.50
St. Joseph Railway, Light, Heat & Power Co.—City	2.00
Interurban between St. Joseph and Savannah	12.00
Springfield Traction Co	5.00
United Railways Co	3.84
	46.84

	Miles.
MONTANA	
Butte Electric Ry.	2.00
Missoula Street Ry.	16.50
	18.50
NEBRASKA	
Lincoln Traction Co.	3.00
Omaha & Council Bluffs Street Ry.	7.00
	10.00
NEW JERSEY	
Atlantic Coast Electric Ry.—Extending line to North Long Branch	0.66
Jersey Central Traction Co.—Between South and Perth Amboy	3.55
Morris County Traction Co.—From Denville to Boonton	5.00
From Morris Plains to Mt. Tabor	5.00
From Hopatcong to Bertram Island	2.25
From Morris Plains to State Hospital	1.60
In Summit	0.50
Mountain Railway Co.—South Mountain and Rock Springs	0.50
North Jersey Rapid Transit Co.—Between Waldwick, Allendale, Ramsey and Mahwah	7.50
Public Service Ry.—Englewood to Tenafly	4.38
	30.94
NEW MEXICO.	
Citizens' Traction & Power Co.	2.00
	2.00
NEW YORK.	
Albany Southern R. R.—From Rensselaer to Electric Park, second track	15.00
Auburn & Syracuse Electric R. R.	0.55
Brooklyn Rapid Transit Co.	7.57
Black River Traction Co.	0.60
Buffalo & Lake Erie Traction Co.—Extension of Fredonia City Lines	0.75
State Line, Northeast cut-off	3.40
Cortland County Traction Co.	2.10
Elmira Water, Light & Railroad Co.	1.00
Hudson & Manhattan R. R.—(Including cross-overs and extra track, but not the track to Henderson Street Yard)	2.82
Hudson Valley Ry.—In Saratoga Springs	1.12
Huntington R. R.	1.21
Interborough Rapid Transit Co.—Viaduct structure	0.14
Kingston Consolidated R. R.	3.00
Long Island R. R.—Main line electrified, Jamaica to Woodside	7.04
Springfield Junction to Long Beach, electrified	9.60
New York Central & Hudson River R. R., electrified electric zone from Wakefield to North White Plains	30.50
New York City Interborough Ry.	1.75
New York & North Shore Traction Co.—Between Roslyn, Manhasset, Great Neck, Little Neck, Douglaston, Bayside, Auburndale, Broadway, Whitestone and Flushing	13.50
New York State Rys.—Rochester Lines	0.52
Oneida Ry.	0.07
Pennsylvania Tunnel & Terminal Railroad Co.—From Harrison through Manhattan to Woodside Avenue, Queens.	54.20
Port Jervis Traction Co.—Port Jervis to Sparrowbush	1.00
Poughkeepsie City & Wappinger's Falls Electric Ry.—Electrified	2.00
Schenectady Ry.	0.91
Syracuse Lake Shore & Northern R. R.	14.00
Syracuse Rapid Transit Ry.	0.31
	174.66
NORTH CAROLINA	
Charlotte Electric Railway, Light & Power Co.	2.00
Goldsboro Traction Co.	5.00
North Carolina Public Service Co.—At High Point	2.50
	9.50
NORTH DAKOTA	
Wahpeton-Breckenridge Street Ry.—From Wahpeton, N. D., to Breckenridge, Minn.	1.60
	1.60
OHIO	
Cincinnati Traction Co.	1.13
Dayton, Springfield & Xenia Southern Ry.—Extended Spring Valley division into Spring Valley, in the city of Dayton	0.64
Dayton Street Ry.	2.00
Fostoria & Fremont Ry.—Between Fostoria, Amsden, Kansas, Burgoon, Havens and Fremont	21.40
Minster & Loramie Ry.—Between Minster and Loramie	3.10
Northern Ohio Traction & Light Co.	0.30
Tri-State Traction Co.	1.00
	29.57
OKLAHOMA	
Citizens Traction Co.—Between Oklahoma City and Great Northeast Park	4.50
Enid City Ry.	3.00
Oklahoma Ry.	31.00
Oklahoma Union Traction Co.	3.00
Sapulpa & Interurban Ry.—Between Sapulpa and Kiefer	3.80
Tulsa Street Ry.	2.00
	14.80
OREGON	
Portland Railway, Light & Power Co.	8.23
	8.23
PENNSYLVANIA	
Central Pennsylvania Traction Co.	0.50
Eastern Pennsylvania Ry.	0.50
Frankford, Tacony & Holmesburg Street Ry.—Between Wissinoming and Bridesburg	1.00
Hanover & McSherrystown Street Ry.—From McSherrystown to Edgegrove and Chapel	1.50
Lehigh Valley Transit Co.	0.25
Philadelphia Rapid Transit Co.	1.81
Pittsburg, McKeesport & Westmoreland Ry.—Between West Newton and Blackburn	11.00
Pittsburgh Railways	4.31
Port Vue Street Ry.	1.50
Scranton Ry.	1.50
Southern Cambria Ry.	1.60
United Traction Street Ry.	0.50
York Railways	0.84
	22.60
SOUTH CAROLINA	
Columbia Electric Street Ry., Light & Power Co.	1.75
	1.75
SOUTH DAKOTA	
Aberdeen Ry.	4.50
Sioux Falls Traction System	0.50
	5.00
TENNESSEE	
Bristol Belt Line Ry.	0.75
Chattanooga Railway & Light Co.—City line	1.36
Interurban between Chattanooga and Rossville	3.00
Jackson Railway & Light Co.	0.75
Johnson City Traction Co.	4.06
Knoxville Railway & Light Co.	0.50
Memphis Street Ry.	4.56
Nashville Railway & Light Co.	4.00
	18.92
TEXAS	
Austin Electric Ry.	2.50
Belton & Temple Traction Co.	0.80
Bryan College Interurban Ry.—Between Bryan and College Station	5.00
Citizens' Ry.	2.00
Corpus Christi Street & Interurban Ry.	6.00
Galveston-Houston Electric Ry.—Galveston to Houston	50.00
Haskell Traction Company	3.75
Houston Electric Co.	3.39
Northern Texas Traction Co.	2.42
San Angelo Street Ry.	1.00
San Antonio Traction Co.	8.00
	84.86
UTAH	
Ogden Rapid Transit Co.—Interurban between Harrisville, Hot Springs, Willard City, Perry and Brigham City	16.00
Salt Lake & Ogden Ry.—Electrified	40.00
Utah Light & Railway Co.—To Sandy, Midvale & Murray	7.00
	63.00
VERMONT	
Rutland Railway, Light & Power Co.—Between Fairhaven and Poultney	7.75
	7.75
VIRGINIA	
Danville Railway & Electric Co.	0.87
Newport News & Old Point Railway & Electric Co.	1.00
Norfolk & Portsmouth Traction Co.	4.20
Roanoke Railway & Electric Co.	1.00
	6.87
WASHINGTON	
Everett Railway, Light & Water Co.	1.72
Seattle-Everett Traction Co.—Between Hall Lake and Everett	13.08
Washington Water Power Co.	7.33
Yakima Valley Transportation Co.	10.00
	32.13
WEST VIRGINIA	
Elkins Electric Ry.—Between Elkins and Roaring Creek Junction	7.00
Fairmount & Northern Traction Co.—Between Barnsville, Riversville, Baxter, Granttown, Bassettville and Fairview	12.00
Morgantown & Dunkard Valley R. R.	2.00
South Morgantown Traction Co.	3.10
	24.10
WISCONSIN	
Beloit Traction Co.	0.50
Milwaukee Electric Railway & Light Co.	5.00
Sheboygan Railway & Electric Co.—Near Plymouth	2.00
Sparta-Melrose Electric Railway & Power Co.—From Sparta to Trout Falls	10.00
Waupaca Electric Light & Railway Co.	0.25
	17.75
WYOMING	
Cheyenne Electric Ry.	0.40
	0.40
CANADA	
British Columbia Electric Ry. Co.—In Vancouver City and Suburbs	13.28
Between New Westminster and Chilliwack	63.40
Cape Breton Electric Co.	0.60
Chatham, Wallaceburg & Lake Erie Ry.—To Pain Court	4.00
Grand Valley Ry.	3.50
Hull Electric Co.	0.85
Montreal Street Ry.	1.90
Montreal & Southern Counties Ry.—Between Montreal South and Longueuil	4.00
Niagara, St. Catherines & Toronto Ry.—Between Welland, Humberstone and Port Colborne	7.00
Ottawa Electric Ry.	1.00
Quebec Railway, Light & Power Co.—In Quebec and from Montcalmville to St. Columban	5.07
Toronto Ry.	3.18
	107.78

RECEIVERSHIPS AND FORECLOSURE SALES IN 1910

The records show that a total of eleven electric railway properties went into receivership during 1910. This is one-half of the number of companies for which receivers were appointed during the previous year. The 1910 record involves companies operating 696.61 miles of track and having outstanding capitalization, according to the latest available statistics, as follows: Bonds, $75,490,735; stock, $12,629,400. The statistics, according to the records of the ELECTRIC RAILWAY JOURNAL, compare for 1909 and 1910 as follows:

	No. of Companies.	Miles of Track.	Outstanding Bonds.	Outstanding Stock.
1909	22	558	$22,325,000	$29,962,200
1910	11	696.61	75,490,735	12,629,400

The 1910 figures of mileage and outstanding bonds would be made very much smaller if the complications which arose in Chicago, affecting the Chicago Railways Company, had not forced that company into voluntary receivership. The appointment of receivers for this company was not due to bankruptcy but was brought about by the management, as a protective measure. This company contributed nearly one-half of the mileage and 80 per cent of the outstanding bonds shown in the record of 1910. The direct cause of the receivership for this company was a court decision favorable to the holders of bonds of the Chicago Consolidated Traction Company, a corporation formerly controlled by the Chicago Union Traction Company, the predecessor of the Chicago Railways Company. In the reorganization of the Chicago Union Traction Company's system and the acquisition of its properties by the Chicago Railways Company, it was believed that no liability under an old guarantee of securities by the Chicago Union Traction Company would accrue to the reorganized corporation, the Chicago Railways Company. Since the court held otherwise, and notwithstanding the fact that the decision was rendered by a lower court and was subject to appeal, the attorneys of the Chicago Railways Company decided that as a protective measure receivers should be appointed. Before the end of the year 1910 the complication which resulted in the temporary receivership of the company was settled and the receivers were discharged without formal foreclosure sale.

Some of the companies which went into receivership during the year had not progressed very far with the construction of the properties which they were organized to promote. The receiverships for 1910 were as follows:

RECEIVERSHIPS DURING 1910.

Company.	Miles of Track.	Bonds Outstanding.	Stock Outstanding.
Belton & Temple Traction Co., Temple, Tex.	13.40	$300,000	$300,000
Chicago Railways Co.	317.34	60,360,735	100,000
Chicago & Southern Traction Co., Chicago, Ill.	72.00	2,500,000	2,500,000
Ft. Dodge, Des Moines & Southern R. R. Co., Ft. Dodge, Ia.	175.00	5,800,000	3,200,000
Janesville Street Railway Co., Janesville, Wis.	7.00	75,000	50,000
Lancaster & Southern Street Railway Co., Lancaster, Pa.	6.10	.....	93,700
Nebraska Traction & Power Co., Omaha, Neb.	11.50	100,000	200,700
Portsmouth & Exeter Street Railway Co., Haverhill, Mass.	12.27	145,000	185,000
St. Louis, Monte-Sano & Southern Railway Co., St. Louis, Mo.	8.00	2,500,000	3,000,000
Sedalia Light & Traction Co., Sedalia, Mo.	9.00	710,000	1,000,000
South Shore Traction Co., Patchogue, N. Y.	65.00	3,000,000	2,000,000
	696.61	$75,490,735	$12,629,400

The foreclosure sales during 1910 affected twenty-two properties, operating a total of 724.36 miles of track. This is not far from the total number of miles of track operated by the companies which went into receivership during the year. If the receivership of the Chicago Railways Company be eliminated from consideration, it is apparent that the mileage of the companies whose properties were sold at foreclosure sale and whose reorganization was thus effected during the year was almost double that of the other receiverships. The foreclosure sales for two years compare as follows:

	No. of Companies.	Miles of Track.	Outstanding Bonds.	Outstanding Stock.
1909	21	488	$21,174,000	$22,265,700
1910	22	724.36	26,374,065	19,106,613

The list of companies whose property was sold at foreclosure includes one company concerning which an explanatory note should be made. An effort was made to effect a reorganization of the properties of the Indianapolis & Cincinnati Traction Company and avoid a foreclosure sale. There was no formal foreclosure sale, although a sale of the properties was made under order of the court in the receivership, due to the fact that holders of $18,000 of the outstanding $2,000,000 of bonds refused to join in the reorganization agreement. The Atlantic Shore Line Railway, which is shown in the list of foreclosures, was placed there because a reorganization was effected by means of a formal foreclosure sale, although there was no preliminary receivership for this property. The Southern Colorado Power & Railway Company is included, although the sale of the property took place just before the close of the year 1909, too late to be included in our compilation for that year. The Wilmington, New Castle & Southern Railway is shown in the list of foreclosure sales. The property of this company is undergoing reorganization and in this process the system has been divided into two parts. One part was sold during 1910 and the balance, it is expected, will be sold early during 1911. During the year the court confirmed the formal sale of the property of the Norfolk & Southern Railway, a steam railroad property which has been reorganized as the Norfolk Southern Railroad. This company operates electric divisions with a mileage of 45.6 miles, but shows no separate capitalization for that part of its system. It has not been included in the compilations. The foreclosure sales during 1910 were as follows:

FORECLOSURE SALES DURING 1910.

Company.	Miles of Track.	Bonds Outstanding.	Stock Outstanding.
Ardmore Traction Co., Ardmore, Okla.	5.00	.....	$500,000
Atlantic Shore Line Railway Co., Sanford, Maine.	97.00	$2,700,000	3,000,000
Belton & Temple Traction Co., Temple, Tex.	13.40	300,000	300,000
Burlington County Railway Co., Hainesport, N. J.	14.80	475,000	484,790
Camden & Trenton Railway Co., Camden, N. J.	31.17	1,371,500	1,750,000
Catskill Electric Railway Co., Catskill, N. Y.	5.40	132,000	138.000
Citizens Electric Co., Eureka Springs, Ark.	3.00	175,000	50,000
Chicago Consolidated Traction Co.	184.00	12,459,000	*650,000
Consolidated Railway & Power Co., Fayetteville, N. C.	4.00	.....	60,000
Eastern Ohio Traction Co., Cleveland, Ohio.	80.00	763,065	2,258,823
Holmesburg, Tacony & Frankford Electric Railway Co., Tacony, Pa.	17.60	400,000	100,000
The Indianapolis & Cincinnati Traction Co., Indianapolis, Ind.	107.00	2,000,000	2,000,000
Owosso & Corunna Electric Co., Owosso, Mich.	10.00	120,000	150,000
Philadelphia & Chester Railway Co., Chester, Pa.	8.83	350,000	350,000
Pittsburg & Allegheny Valley Railway Co., Leechburg, Pa.	8.50	533,500	1,500,000
Pittsburg & Westmoreland Railway Co., McKeesport, Pa.	8.00	335,006	350,000
St. Francois County Railway Co., Farmington, Mo.	15.00	240,000	300,000
Southern Colorado Power & Railway Co., Trinidad, Col.	21.00	1,000,000	1,000,000
Toledo & Indiana Traction Co. Toledo, Ohio.	52.00	1,650,000	2,500,000
Trenton & New Brunswick Railroad Co., Trenton, N. J.	23.70	1,000,000	1,000,000
Washington, Berwyn & Laurel Electric Railroad Co., Washington, D. C.	8.96	220,000	500,000
Wilmington, New Castle & Southern Railway Co., New Castle, Del.	6.00	150,000	165,000
	724.36	$26,374,065	$19,106,613

*Underlying companies.

The Schöneberg (Berlin) Electric Underground Railway was opened to public traffic on Dec. 1, 1910. A 5-minute service is provided during the greater part of the day, with a 10-minute service early in the morning. Steps have been taken to increase the capacity of the Berlin Elevated & Underground Railway, which interchanges traffic with the Schöneberg line; a 3½-minute service is to be arranged. The six-car trains recently introduced on the elevated railway are being increased in number during the rush hours.

INTERURBAN CONSTRUCTION IN THE CENTRAL STATES DURING 1910

WITH ACCOMPANYING MAP

The mileage of the interurban railways of the North Central States showed comparatively little growth during 1910. The largest additions to the interurban network of these States were made by roads that were well under way toward completion before the year began. Other scattering mileage is composed chiefly of small extensions and short connecting links. The plans for 1911 as so far announced do not indicate that any considerable mileage will be added in these States.

The Electric Railway Journal again presents with the first issue of the year a map showing the location of the interurban lines in those Central States in which interurban railroading first began and has shown the greatest development. The preparation of the map has been made with due regard to accuracy. Imprints of the map as it was published a year ago were mailed to all the roads within the territory shown, with requests that corrections and additions for the 1911 map be indicated. The information thus received has been transferred to the original map, from which the accompanying engraving has been made. In addition to the corrections and additions as thus obtained, the proposed lines have been checked with the news items presented in the construction columns of this paper. Thus every effort has been made to present the map of the interurban roads of the Central States in as correct a form as possible. However, on account of the wide scope of the territory included, there may be some errors of location and if such are observed this paper will greatly appreciate any advice that may assist in making more complete the records of new construction and proposed roads. Acknowledgment is made to The Arnold Company, Chicago, Ill., for the use of the original drawing from which the engraving for the accompanying map was made.

The growth of the interurban mileage in the North Central States during 1910 has been fairly well distributed among the different States. In Ohio no new line of any considerable length has been completed. Probably the most important road now under way is that between Fostoria and Fremont. This line, nearly 22 miles long, has been graded and the track is about completed so that it is expected to begin service about March, 1911. The Fostoria and Fremont line is of particular interest because it is a connecting link which will greatly shorten the through route between Lima and Cleveland, Ohio. Lima, it will be noted, is now served by interurban roads radiating in six directions. The three lines to the south and west have through connections with the three lines to the north and east. The present business for points east of Toledo on the Lake Shore Electric Railway has, of necessity, been sent through Toledo. With the completion of the Fostoria-Fremont line a direct route from Lima to Cleveland will be available. This line has been promoted and built by interests friendly to those of the Western Ohio Railway. The lines of the latter company form the mid-section of the well-known Dayton and Toledo through route over which considerable traffic from the southern part of Ohio is carried each year to the Great Lakes region by way of Lima, Findlay and Toledo. The new connection from Fostoria, the northeastern terminus of the Western Ohio system, will offer a fast through route from Lima direct to the numerous resorts located along the south shore of Lake Erie and served by the Lake Shore Electric Railway.

The interurban network of Indiana is closely connected with the Ohio lines. A new road crossing the State line, which is said to be well under construction, will connect Fort Wayne and Bryan, Ohio, thus offering a short route between Fort Wayne and Toledo via the Toledo and Indiana property. The line from Fort Wayne to Bryan is being graded and some bridges have been built. This route between Fort Wayne and Toledo when completed will be about 100 miles long.

The largest piece of new track to be put into service during 1910 in Indiana was the Indianapolis, New Castle & Toledo road from Indianapolis to New Castle, 41.5 miles long. The Bluffton, Geneva & Celina Traction Company inaugurated service during the year on a new road extending 18.5 miles southeast from Bluffton toward Celina, Ohio. This company announces that in 1911 it will build 21 miles of additional track to connect its present line with the Western Ohio Railway at Celina. Considered from the standpoint of long-distance travel, the most important track link which was completed in 1910 was that of the Winona Interurban Railway between Mentone and Chili in the north central part of Indiana. This link has made possible through electric travel from Sheboygan, Wis., by way of Milwaukee, Chicago, South Bend, Warsaw, the newly built section to Peru, Fort Wayne, Lima and Toledo, to Detroit, Cleveland and east along the south shore of Lake Erie to Buffalo and other New York State points. From the cities named in Indiana and Ohio other routes radiate to the important traffic centers in Indiana and Ohio and to Louisville, Ky. Through service is now operated between South Bend and Indianapolis over the lately completed section by the Chicago, South Bend & Northern Indiana, the Winona Interurban and the Indiana Union Traction companies. During the past year the Chicago, Lake Shore & South Bend Railway, a high-speed single-phase line between South Bend and Pullman, Ill., completed double-tracking 10 miles of its road through the densely populated manufacturing district south of Chicago. The Kokomo, Frankfort & Terre Haute Traction Company announces that during 1911 it probably will build from Kokomo 26 miles southwest to Frankfort. This company is allied with the Kokomo, Marion & Western Traction Company. Another larger project which it is stated may be got under way during 1911 is that of connecting the "Ben Hur Route" at Crawfordsville with the Illinois Traction System at Danville, Ill. This link will require 42 miles of track and its completion will make possible fast service between Indianapolis and the larger cities in central and southern Illinois.

In 1909 the Michigan United Railways completed a 37-mile high-speed line between Jackson and Lansing. During 1910 this company has nearly completed construction work on a line 23 miles long connecting Haslett, a suburb 9 miles east of Lansing, with Owosso. These new lines of the Michigan United Railways are operated by third-rail and are built for high-speed passenger and freight service. In southwestern Michigan the Benton Harbor-St. Joe Railway & Light Company has completed a 15-mile line from Benton Harbor southeast to Eau Claire and Paw Paw Lake. During 1911 it is announced that this company will extend this new line eastward to Dowagiac.

The Detroit River Tunnel Company early in October inaugurated service through its twin tubes extending under the Detroit River and connecting its Canadian lines with those in Michigan.

The increase in electrically operated track has been greater in Illinois than in others of the Central States, the largest mileage having been added by the Rock Island Southern Railway and the Chicago, Aurora & De Kalb Railroad. The Rock Island Southern line consists of a 50.2-mile, 11,000-volt substantially built freight and passenger road from Rock Island to Monmouth, Ill. A 19-mile section of this track is a branch of the Chicago, Rock Island & Pacific steam railroad system, which the interurban company has leased for a term of 25 years. In constructing the new roadbed lately put into operation 1,300,000 cu. yd. of earthwork was handled in 31 miles and a number of large bridges and trestles were built. One of the steel bridges is 625 ft. long and 75 ft. high. The Chicago, Aurora & De Kalb Railroad during the year electrified a 30-mile gasoline-operated line between Aurora, De Kalb and Cortland.

The ceremonies attending the dedication of the McKinley Bridge at St. Louis probably attracted as widespread attention from the public as any piece of electric railway construction work consummated during 1910. This bridge was formally

opened Nov. 10 in the presence of the Governors of Illinois and Missouri and many other people of commercial and political note. The entrance to St. Louis of the Illinois Traction System over its bridge and new line within that city has been made possible by constructing the most extensive terminal project ever undertaken by an interurban railway, the general and detail features of which have been described fully in numerous articles presented by this paper during the past year. The total cost of the project, which includes the McKinley Bridge; 10 miles of double track, largely on private right-of-way through congested territory; a 14,000-kw generating station; the improvement of a 24-acre carload freight terminal and the construction of passenger and express stations within St. Louis, is approximately $7,000,000. Since the completion of the bridge link between Illinois and Missouri the traffic passing in and out of the St. Louis terminal has more than met expectations.

The Illinois Traction System announces that during the present year it will complete the construction of its extension from Morris northeast to Joliet. This will give it a system in northern Illinois of more than 100 miles of track, separated from its principal system in the central part of the State by a gap of less than 50 miles. Construction plans for the latter gap have not been announced.

In Wisconsin the Sparta-Melrose Electric Railway & Power Company built 10 miles of track during 1910, from Sparta to Trout Falls, and now announces that the road will be completed to Melrose during 1911. It is expected also that the Chicago, Harvard & Geneva Lake Railroad interests, under the name of the Marengo, Harvard & Northern Illinois, during the present year will construct 10 miles of track north from Walworth to Delavan Lake in Wisconsin.

In Iowa during 1910 the Waterloo, Cedar Falls & Northern Railway constructed an 8-mile extension to Waverly. A line 6.6 miles long between Centerville and Mystic was also put into operation in Iowa last year. The Tri-City Railway Company, of Davenport, expects to build about 35 miles of interurban line westward from Davenport to Muscatine and five miles of city track are planned for 1911. Another new line put into operation in Iowa during the past year connects Charles City and Marble Rock and is 15 miles in length.

The Minneapolis, Rochester & Dubuque Railway, of St. Paul, Minn., has inaugurated service during 1910 on 40 miles of line extending south from St. Paul to Northfield. Service is given with gasoline motor cars.

The Lexington & Interurban Railway in Kentucky completed during the early part of the year a fourth interurban line out of Lexington, extending southward 12 miles to Nicholasville, and passing through a rolling country which required particularly heavy earthwork.

TESTS ON GERMAN ACCUMULATOR CARS

The Halle (Germany) railways have recently completed some tests with a six-axle accumulator car on the line between Koltbus and Schonwälde, which is 40 miles long. The car weighs 60.5 tons, and was loaded with 6 tons to represent passengers. The route was first traversed at 30 m.p.h., stopping at all stations, then at 37.5 m.p.h. without stopping and finally at 37.5 m.p.h. including stops. The results are shown in the following table:

State of Rails.	Speed in miles per hour.	No. of stops. Going.	Return.	Energy consumption (kw.-hours). Going.	Return.	Watt-hours per ton mile. Going.	Return.
Damp	30	10	10	61	63	22 9	23.7
Damp	37.5	1	3	52.5	53.5	19.8	20.0
Dry	37.5	10	10	67.5	66.5	25.3	24.9

The battery consisted of 168 cells and had a capacity of 368 amp-hours. It can run 62½ miles on one charge.

Texas Traction Company, Dallas, Tex., and several gas and electric companies under the same management have issued a card extending the season's greeting.

RECENT ELECTRIC RAILWAY CAR DESIGN

The table which is printed on pages 22, 23 and 24 of this issue gives the principal dimensions and other descriptive data of more than 100 representative types of electric railway cars for city, suburban and interurban service. Most of these cars have been built during the last two or three years, and many of them have been illustrated and described in the ELECTRIC RAILWAY JOURNAL. In the following explanatory notes references are given to the date and page number of these descriptive articles. The weights and dimensions of cars given in the table were obtained from the railway companies and acknowledgment is made to all those who supplied the data from which the table was compiled.

NOTES ON TABLE OF CAR DIMENSIONS

(1) This car was illustrated and described in the ELECTRIC RAILWAY JOURNAL for Oct. 9, 1909, page 841. The platforms are inclosed with folding doors and gates and folding seats holding six passengers may be let down on the front platform, giving a total seating capacity of 42.

(2) The closed cars of the Little Rock Railway & Electric Company are not designed for prepayment operation, but the conductor stands near the rear door and collects fares from passengers as they enter the car.

(3) All cars of the Los Angeles Railway are being rebuilt to conform to the standard dimensions given in the table. The roofs are of the arched type.

(4) These are the new standard cars of the United Railroads of San Francisco. Eighty cars of this type are under construction.

(5) Four-motor equipments. These cars were described in the ELECTRIC RAILWAY JOURNAL for Oct. 2, 1909, page 503. They are the standard type of the Denver City Tramway.

(6) Two-motor equipments. Bodies are the same as the four-motor equipments.

(7) Standard trail car. Has arched roof and center side entrance.

(8) These cars were described in the ELECTRIC RAILWAY JOURNAL for Oct. 2, 1909, page 503. They have folding platform doors and steps, manually operated.

(9) See ELECTRIC RAILWAY JOURNAL for Sept. 18, 1909, page 434, for description of these cars. Used in city and suburban service. They have sliding platform doors and folding steps pneumatically operated.

(10) These cars were described in the ELECTRIC RAILWAY JOURNAL for Dec. 24, 1910, page 1247. The platforms are open with folding gates over the steps.

(11) All-steel cars. Described in the ELECTRIC RAILWAY JOURNAL for Aug. 28, 1909, page 312. These cars have the same dimensions and substantially the same weight as the wooden cars of the same design, of which the company has more than 600 in service.

(12) These cars have platforms arranged for conversion to prepayment operation at small expense.

(13) Complete detail weights and full description of these cars were printed in the ELECTRIC RAILWAY JOURNAL for April 2, 1910, page 571.

(14) Described in ELECTRIC RAILWAY JOURNAL for Oct. 1, 1910, page 498.

(15) The platforms of these cars are inclosed with folding gates; can be used as prepayment cars if desired. The weights given are actual scale weights.

(16) See ELECTRIC RAILWAY JOURNAL for March 13, 1909, page 469.

(17) These cars were illustrated and described in the ELECTRIC RAILWAY JOURNAL for Dec. 31, 1910, page 1285.

(18) Platforms inclosed with folding gates.

(19) Described in ELECTRIC RAILWAY JOURNAL for Nov. 2, 1907, page 917.

(20) See ELECTRIC RAILWAY JOURNAL for April 2, 1910, page 566. The weights given are scale weights.

(21) Floor plan of this car was shown in the ELECTRIC RAILWAY JOURNAL for July 16, 1910, page 119.

Name of Railway.	Class of Service.	Type of Car.	Date Built.	Single or Double End.	Prepayment Operation.	Length Overall. Ft. In.	Platform Length Front. Ft. In.	Platform Length Rear. Ft. In.	Width of Body. Ft. In.	Height Overall. Ft. In.	Number Seats.	Type of Seats.	Distance C. to C. Cross Seats. In.	Approx. Wt. of Body. Lbs.	Approx. Wt. Trucks and Elec. Equip. Lbs.	Approx. Wt. Total Lbs.	Single or Double Trucks.	Type of Truck.	Ft. Truck Wheelbase. In.	Diam. of Wheels. In.	Type of Wheels.	Type of Motors.	Type of Control.
CITY CARS																							
ALABAMA																							
Birmingham Ry.,Lt.& Pwr.Co. (1)	City	Closed	1910	Double	Yes	37–0	6–0	6–0	8–6	11–8¼	36	Cross	29½	17,000	13,000	30,000	Single	Warner	9–0	33	C. I.	G.E.-57	K-10
ARKANSAS																							
Little Rock Ry. & Elec. Co. (2).	City	Semicon.	1908	Double	No	43–6	6–0	6–0	8–1	12–0	40	Long.&Cross	32¼	.....	.....	46 000	Double	St.L.-47	4–6	33	C. I.	G.E.-80	K-28
Little Rock Ry. & Elec. Co.	City	Closed	1905	Double	No	39–5	5–8	5–8	8–1	12 0	32	Long.&Cross	32¼	.....	.....	32,000	Double	Brill 27-G.	4–0	33	C. I	G.E.-57	K-11
Little Rock Ry. & Elec. Co.	City	Closed	1904	Double	No	29–5	4–6	4–6	8–1	12–0	26	Long.	....	.....	.....	20,000	Single	St.L.-34	7–0	33	C. I.	G.E.-67	K-10
Little Rock Ry. & Elec. Co.	City	Open	1904	Double	No	32–0	4–0	4–0	7–6	12–0	50	Cross	32¼	.....	.....	20,000	Single	St.L.-34	7–0	33	C. I.	G.E.-67	K-10
CALIFORNIA																							
Los Angeles Ry (3)	City	Calif.	1910	Double	Yes	44–7	6–9	6–9	8–2	12–0	44	Long.&Cross	28½	16,700	19,300	36,000	Double	Ins.Hung	5–3	30	C. I.	West.306	K
Northern Elec. Ry.	City	Calif.	1908	Double	No	39–3	.....	.....	8–4	12–6½	44	Long.&Cross	32	15,000	21,000	36,000	Double	St.L.-47	4–6	33	C. I.	G.E.-202	K-11
Northern Elec. Ry.	City	Open	....	Double	No	39–4	.....	.....	8–2	11–11	84	Cross	31	9,000	21,000	30,000	Double	St.L.-47	4–6	33	C. I.	G.E.-67	K-10
United R. R. San Francisco (4).	City	Closed	1910	Double	Yes	47–0	7–4	7–4	9–0	11–6½	48	Long.	.....	27,000	26,000	53,000	Double	Out.Hung	4–6	33	C. I.	G.E.-216	K-28
United R. R. San Francisco.	City	Closed	1907	Double	No	45–4	6–6	6–6	9–2	12–0	44	Long.&Cross	.....	28,000	27,000	55,000	Double	Brill 27-G.	4–4	33	C. I.	G.E.-90	K-28
United R.R. San Francisco.	City	Closed	1906	Double	No	45–4	6–6	6–6	9–2	12–0	44	Cross	33	26,000	26,000	52,000	Double	McG.10 A.	6–0	33	C. I.	G.E.-80	K-28
COLORADO																							
Denver City Tramway (5).	City	Side Ent.	1909	Single	No	43–10	3–8⅝	.....	8–2	11–11	52	Cross	30	13,178	25,202	38,380	Double	Brill-27G.	4–6	33	C. I.	G E -58	K-35
Denver City Tramway (6)	City	Side Ent.	1909	Single	No	43–10	3–8⅝	.....	8–2	11–11	52	Cross	30	13,178	22,662	35,840	Double	Brill-27G.	4–6	33	C. I.	West.306	K-36
Denver City Tramway (7)	City	Trailer	1905	Single	No	38–1⅛	.....	.....	8–2	11–1¼	46	Cross	28½	6,760	6,880	13,640	Double	Arch Bar	4–4	30	C. I.	.....	.....
DIST. OF COLUMBIA																							
Capital Traction Co. (8)	City	Semicon.	1910	Double	Yes	41–0	5–7	5–7	8–5	11–7	36	Cross	33	17,500	16,100	33,600	Double	Max.Trac.	4–6	31	C. I.	West.306	K-27
Capital Traction Co. (9)	Sub.	Semicon.	1909	Double	Yes	43–8	5–7	5–7	8–9	11–6	40	Cross	31	21,300	26,800	48,100	Double	Std.O-50	4–6	33	F. S.	West.101	K-29-B.
Wash. Ry. & Elec. Co.	City	Closed	1909	Double	Yes	41–9	5–2	5–2	8–3	11–6⅛	40	Long	.....	18,000	17,000	35,000	Double	Brill-39	4–6	32	S.T.	G.E.-210	K-39
FLORIDA																							
Jacksonville Elec. Co. (10)	City	Closed	1910	Single	Yes	39–6½	5–0	5–0	8–8	.....	44	Cross	.....	12,179	21,293	33,472	Double	Max Trac.	4–6	33	C. I.	G.E.-219	K-36
GEORGIA																							
Georgia Ry. & Elec. Co.	City	Closed	1910	Double	Yes	41–6	6–0	6–0	8–2	12–6	36	Cross	29½	16,000	18,500	34,500	Double	Max.Trac.	4–6	33	R.S.	West.112	K-35
Georgia Ry. & Elec. Co.	Sub.	Closed	1907	Double	No	45–0	5–0	5–0	8–2	12–8	48	Cross	30	28,000	25,000	45,000	Double	Brill-27F.	4–6	33	C. I.	West.101	K-28
Georgia Ry. & Elec. Co.	City	Closed	1910	Double	No	31–8	5–0	5–0	8–2	12–6	28	Cross	31	8,000	12,000	20,000	Single	Balt.	7–6	33	C. I.	West.101	K-11
ILLINOIS																							
Chicago Rys. (11)	City	Closed	1909	Double	Yes	49 2	8–4½	8–4½	6–9	11–8	40	Cross	32	19,800	33,200	53,000	Double	Out.Hung	4–10	33	R.S.	G.E.-216	K-35
Chi. & Mil. Elec. Ry.	City	Semicon.	1909	Double	Yes	49–2	7 3	7–3	8–6½	12–4½	52	Cross	29⅜	21,500	30,500	52,000	Double	Ins.Hung	6–3	33	R.S.	G.E.-216	K-28
Springfield Consol. Ry. (12)	City	Closed	1910	Double	No	34–6	6–3	6–3	8–0	11–4	28	Long.	.....	9,800	9,200	19,000	Single	.....	7–0	33	C. I.	G.E.-54	K-10
INDIANA																							
Ft. Wayne & W. V. Trac. Co.	City	Closed	1909	Double	No	32–1	5 2½	5 2½	8 7	12–1	32	Long.	.....	8,000	12,140	20,140	Single	Curtis	8–0	33	C. I.	G.E.-80	K-10
Ind. Trac. & Ter. Co.	City	Closed	1909	Single	No	46 9½	4 6	8–0	8 6	12–1½	43	Long.&Cross	30	23,200	20,300	43,500	Double	Std.O-50	4–10	34	R.S.	West.93	K-11
KENTUCKY																							
Louisville Ry.	City	Closed	1910	Single	Yes	45 3	6–0	7–6	8 3	12–2¼	41	Cross	32	.....	.....	44,000	Double	Out.Hung	4–10	34	R.S.	West.307	K
MARYLAND																							
United Rys. & Elec. Co., Balt.	City	Semicon.	1910	Double	Yes	43 9	5–8½	5–8½	8 2	12 5	42	Cross	32	15,500	26,500	42,000	Double	Out.Hung	4–6	33	C. I.	West.101	K-28
United Rys. & Elec. Co.	City	Semicon.	1907	Double	No	43 4	5 7½	5–7½	8 2	12 7	44	Cross	32	20,500	31,000	51,500	Double	Ins.Hung	6–0	34	S.T.	West.101	West.M.U
United Rys. & Elec. Co., Balt.	City	Semicon.	1935	Double	No	42 3	5 0	5 0	8 2	12 5	44	Cross	32	18,500	26,500	45,000	Double	Out.Hung	4–6	33	C. I.	West.101	K-28
MASSACHUSETTS																							
Boston Elevated Ry.	City	Semicon.	1911	Double	Yes	48–2½	6–0	6–0	8 8⅜	12–0	52	Cross	30	19,000	34 000	53,000	Double	Ins.Hung	6–1	33	R.S.	.....	.....
Boston & Northern St. Ry. (13)	City	Semicon.	1909	Double	No	39–6	5–3½	5–3½	8–4	11–9	40	Long.&Cross	32	11,170	30,920	42,090	Double	Std.O 50	4–10	34	R.S.	G.E.-80	K-28
Boston & Northern St. Ry (14)	City	Open	1910	Double	No	40–11	.....	.....	9–0	11–6	70	Cross	.....	.....	.....	36,158	Double	Std.O-50	4–10	33	C. I.	G.E.-80	K-28
MICHIGAN																							
Detroit United Ry.	City	Closed	1911	Single	.....	42 3	5 2	5–10	8–4½	12–7½	44	Long.&Cross	29½	14,800	23,800	41 800	Double	Out.Hung	5–0	33	C. I.	West.310	K-35
Grand Rapids Ry.	City	Semicon.	1910	Double	Yes	46–6	8–3	8–3	9–0	11–10	36	Cross	31½	15,000	19,260	34,260	Double	Brill-39E.	4–6	33	C. I	G.E.-210	K-36
MINNESOTA																							
Duluth St. Ry.	City	Closed	1910	Single	No	46 7¼	5 3	5–9	9 3⅛	12–2	50	Cross	30	23,960	23,940	47,900	Double	Ins.Hung	6–0	34	R.S.	G.E.-213	K-37
Duluth St. Ry.	City	Closed	1905	Single	No	45 2⅛	4–9	4–9	8 8⅜	12–0½	50	Cross	30	20,600	27,600	48,200	Double	Ins.Hung	6–0	33	C. I.	G.E.-70	K-28
Duluth St. Ry.	City	Closed	1900	Single	No	43–2⅛	3–8½	3–8½	8–8⅜	12–0½	50	Cross	30	22,200	21,840	44,040	Double	Ins.Hung	6–0	33	C. I.	G.E.-67	K-6
Twin City Rapid Transit Co.	City	Semicon.	1910	Single	.....	46–5	6–6	6–3	7–1	12–2	50	Long.&Cross	.....	18,611	27,586	46,200	Double	M.C.B.	6–0	34	R.S.	G.E.-216	K-37

Name of Railway.	Class of Service.	Type of Car.	Date Built.	Single or Double Brd.	Prepayment Operation.	Length Overall. Ft.	In.	Platform Length Front Ft.	In.	Platform Length Rear. Ft.	In.	Width of Body. Ft.	In.	Height Overall. Ft.	In.	Number Seats.	Type of Seats.	Distance C. to C. Cross Seats. In.	Approx. Wt. of Body. Lbs.	Approx. Wt. Trucks and Elec. Equip. Lbs.	Approx. Wt. Total Lbs.	Single or Double Trucks.	Type of Truck.	Ft. Truck Wheelbase. In.	Diam. of Wheels. In.	Type of Wheels.	Type of Motors.	Type of Control.
MISSOURI																												
United Rys. St. Louis (16)	City	Closed	1909	Single	Yes	47	2¾	6	10⅜	6	10⅜	9	0	12	3	50	Cross		23,300	26,250	49,550	Double	Out.Hung	4	6	33	C. I	G.E.-80	K-35
NEBRASKA																												
Omaha & Council Bluffs (17)	City	Closed	1910	Single	Yes	42	0	5	0	6	8	8	3			40	Long. & Cross				40,000	Double	Max. Trac.	4	6	33	C. I	G.E.-80	
NEW JERSEY																												
Pub. Serv. Ry., Newark (18)	City	Closed	1910	Double	Yes	46	4	7	2	7	2	8	7	11	6	41	Long.		21,400	24,200	45,600	Double	Brill-27G	4	6	33	C. I	West. 101	K-6
Pub. Serv. Ry., Newark	Sub.	Closed	1910	Single	Yes	44	0	5	0	7	0	8	7	11	6	41	Long.		20,000	25,500	45,500	Double	M.C.B.	5	10	34	F. S.	West. 101	K.-6
NEW YORK																												
Brooklyn Rap. Transit Co. (19)	City	Semicon.	1907	Double	No	38	3¾	5	1⅞	5	1⅞	7	11½	11	11⅜	36	Long.		17,860	17,340	35,200	Double	Max. Trac	4	4	34	R. S	West. 93	K-28
Coney Island & Brooklyn	City	Closed	1907	Double	No	38	10	4	10	4	10	7	11	11	6	36	Long.		15,070	16,550	32,620	Double	Std. O 45	4	4	33	C. I	G.E. 90	K-11
Coney Island & Brooklyn	City	Open	1904	Double	No	29	0	3	0	3	0	8	8	11	9	68	Cross		13,510	11,640	25,150	Double	Max. Trac	4	0	33	C. I	West. 49	K-10
Lynda. Johns & Gloversville	City	Closed	1910	Double	No	40	1	4	8½	4	8½	8	6	13	6	58	Cross				44,000	Double	Trucks	4			R. S	G.E. 88	K-34
Metropol. St. Ry. N. Y. (20)	City	Closed	1908	Double	Yes	46	11	7	8½	7	8½	8	3	11	3¾	47	Long.		17,673	20,927	38,600	Double	Max. Trac.	4	6		R. S	West. 310	K-27
Rochester Ry.	City	Semicon.	1910	Single	Yes	44	3					8	4	12	1½	42	Cross		21,400	27,200	48,600	Double	Brill	4	6	33	C. I	G.E. 219	K-35
Rochester Ry.	City	Semicon.	1907	Double	No	46	2					8	0	12	6	50	Cross		23,240	23,180	46,400	Double	Brill	4	6	33	C. I	G.E. 86	K-28
Syracuse R. T. Ry. (21)	City	Semicon.	1910	Single	Yes	47	11	5	8	6	6	8	3	11	3¾	41	Long. & Cross	30	21,800	29,170	51,000	Double	Ins. Hung	4	6	33	C. I	G.E. 216	K-35
Third Ave. R.R. (22)	City	Semicon.	1908	Double	Yes	45	0	6	6	6	6	8	8	11	1½	48	Cross	30	16,192	20,463	36,655	Double	Max. Trac	4	6		R. S	West. 319	K-27
OHIO																												
Cleveland Ry. (23)	City	Closed	1908	Single	Yes	52	0	8	0	8	0	8	3½	11	4	50	Cross	31	17,676	23,980	41,656	Double	Brill	4	6	33	C. I	West. 101	K
Nor. Ohio Trac. & Lt. Co. (24)	City	Convert.	1909	Single	No	42	6	4	10	5	0	8	7	13	6	48	Long. & Cross		24,000	26,000	50,000	Double	Out Hung	4	9	33	C. I	West. 191	K-28
Nor. Ohio Trac. & Lt. Co.	City	Semicon.	1902	Single	No	40	0	4	6	4	10	8	6½	13	2	40	Cross		22,000	23,000	45,000	Double	Brill-27F.	4	0	33	C. I.	West.-38	K-6
PENNSYLVANIA																												
Phila. Rapid Transit Co. (25)	City	Semicon.	1910	Double	Yes	36	4	5	0	5	0	7	7	12	0	32	Long.		15,500	15,700	31,200	Double	Max. Trac.	4	6	33	R. S	G.E. 80	K-11
Pittsburgh Rys. (26)	City	Semicon.	1910	Single	Yes	46	8	0	0	6	10	8	2	12	4	57	Long. & Cross	30	18,000	30,000	48,000	Double	Ins. Hung	5	7½	34	R. S.	West. 306	K-43
TEXAS																												
San Antonio Traction Co.	City	Semicon.	1910	Double	Yes	44	6	7	9	7	9	8	1½	12	0	40	Cross				40,700	Double	Brill 27G	4	6		C. I	G.E. 54	K-12
San Antonio Traction Co.	City	Semicon.	1909	Double	No	43	8	7	10	7	10	8	0	12	1	40	Cross				39,500	Double	Brill 27G	4	6		C. I	G.E. 54	K 12
San Antonio Traction Co.	City	Semicon.	1907	Double	No	40	0	6	0	6	0	8	0	12	1	40	Cross				34,500	Double	Brill-27G.	4	6	33	C. I.	G.E.-54	K-12
UTAH																												
Utah Lt. & Ry. Co.	C.&S.	Semicon.	1908	Double	Yes	44	0	6	0	6	0	8	6	11	6	44	Cross	30½	21,290	26,710	48,000	Double	St.L.-47	4	6	33	C. I	G.E.-80	K-28
WASHINGTON																												
Tacoma Ry. & Pwr. Co.	City	Closed	1910	Single	Yes	44	0	4	6	6	6	7	0	12	2	55	Long.		14,055	20,565	34,620	Double	Brill-27G.	4	0	33	C. I.	G.E.-58	K-6
WISCONSIN																												
Milwaukee Elec. Ry. & Lt. Co.	City	Closed	1910	Double	Yes	50	0	6	9	6	9	8	7			52	Long. & Cross	29⅝	26,000	24,000	50,000	Double	Ins. Hung	6	0	34	R. S	G.E.-216	K
Milwaukee Elec. Ry. & Lt. Co.	City	Closed	1906	Double	No	41	0	5	2	5	2	8	4½	12	5	44	Long. & Cross	29⅝	17,000	23,000	40,000	Double	Ins. Hung	5	10	34	R.S.	G.E.-80	K-28
CANADA																												
Toronto Ry. (27)	City	Convert.	1910	Single	Yes	44	9	6	6	7	0	7	11	12	6	38	Long. & Cross		24,000	23,356	47,356	Double	Curtis	4	6	33	C. I	G.E. 80	K-6
Winnipeg Elec. Ry.	City	Closed	1909	Single	Yes	45	4	4	0	6	5	8	7½	12	2	40	Long.		20,000	27,247	47,247	Double	Brill-27G.	4	6	33	R.S.	G.E. 80	K-6
INTERURBAN CARS—																												
CALIFORNIA																												
Los Angeles Pacific Co.	Int	Calif		Double	No	49	2	4	8	4	8	9	4	12	8	56	Cross	30	30,360	44,440	74,800	Double	Ins. Hung	6	5	34	R. S	G.E. 73	Type M
Los Angeles Pacific Co.	Int	Calif		Double	No	41	2	4	2	5	2	8	6	12	0	48	Cross	31½	18,880	21,520	40,400	Double	Ins. Hung	5	6	33	C. I	West.-89	K-28
Northern Elec. Ry.	Int	Comb.	1907	Double	No	55	4	5	6	5	6	9	3½	13	2	60	Cross	33	32,200	51,200	83,400	Double	Bald.-200	6	10	37½	R. S	West. 121	West. M. U.
Pacific Electric Ry.	Int	Calif.	1910	Double	No	43	0½	4	1¼	4	1¼	8	2¾	12	1⅞	48	Cross	30	29,596	28,904	58,500	Double	M.C.B.	5	7	36	R. S	West. 306	West. M. U.
Pacific Electric Ry.	Int.	Calif.	1907	Double	No	50	10½	5	2½	5	0½	8	10¾	12	3½	56	Cross	30	34,596	35,004	69,600	Double	St. L.-23	6	4	33	R. S	West. 112	West. M. U.
Pacific Electric Ry.	Sub.	Calif.	1910	Double	No	39	1	3	10¼	3	10¼	8	2	11	8	44	Long. & Cross	30	16,030	28,720	43,750	Double	Ins. Hung	5	3	30	C. I.	West. 101	K-14
ILLINOIS																												
Chi. & Mil. Elec. Ry.	Int.	Clo. Mot.	1910	Double	No	52	3	5	4	5	4	8	8¾	13	5 9/16	52	Cross	34			75,000	Double	M.C.B.	6	6	35	R.S.	G.E.-73	Type M
Chi. & Mil. Elec. Ry.	Int.	Buffet	1910	Double	No	52	3	5	4	5	4	8	7 7/16	13	5 5/16	29	Chairs				75,000	Double	M.C.B.	6	6	35	R.S.	G.E. 73	Type M
E. St. L. & Sub. Ry.	Sub.	Closed	1909	Double	No	45	4	5	6	5	6	8	8	13	0	30	Long. & Cross	30½	26,800	27,000	53,800	Double	Brill-27E.	6	6	34	R.S.	G.E.-216	Type M
INDIANA																												
Chicago, L. S. & So. Bend	Int.	Trailer	1908	Double	No	50	0	4	1	4	1	10	0	13	0	52	Cross		25,000			Double	Bald.-398	6	6	33	C. S		
Chicago, L. S. & So. Bend	Int.	Closed	1907	Single	No	57	2	3	4	4	0	10	0	15	4	60	Cross		37,000	75,000	112,000	Double	Bald. 363	7	0	38	R. S	West. 148	West. M. U.
Chicago, L. S. & So. Bend	Sub	Closed	1908	Double	No	42	8	4	0	4	0	8	5	14	0	44	Cross		24,000	45,000	69,000	Double	Bald.-384	6	6	33	C. S	West. 135	Hand
Ft. Wayne & W. V. Trac. Co.	Int	Closed	1909	Single	No	55	0			5	0	8	8	13	8	36	Cross	34	41,000	39,000	80,000	Double	Ins. Hung	7	0	37	R. S	G.E. 205	L 1
Ft. Wayne & W. V. Trac. Co. (28)	Int	Closed	1905	Single	No	61	6			7	0	8	8	13	8	46	Cross	34	60,000	40,000	100,000	Double	Ins. Hung	6	5	37	R. S	West. 121	West. M. U.
T. H. I. & E. Trac. Co.	Int	Closed	1908	Double	No	61	6	11	8½	5	0	9	0	13	10	58	Cross	33	44,200	40,200	84,400	Double	Std. C-80	7	0	38	R.S.	West. 121	West. M. U.

Name of Railway.	Class of Service.	Type of Car.	Date Built.	Single or Double End.	Prepayment Operation.	Length Over All. Ft. In.	Platform Length Front Ft. In.	Platform Length Rear Ft. In.	Width of Body. Ft. In.	Height Over All. Ft. In.	Number Seats.	Type of Seats.	Distance C. to C. Cross Seats. In.	Approx. Wt. of Body Lbs.	Approx. Wt. Trucks and Elec. Equip. Lbs.	Approx. Wt. Total Lbs.	Single or Double Trucks.	Type of Truck.	Ft. Truck Wheelbase. In.	Dia. of Wheels. In.	Type of Wheels.	Type of Motors.	Type of Control.
MICHIGAN																							
Detroit United Ry. (22)	Int.	Closed	1910	Single	No	52–7½	5–4½	5–4½	8–6	13–1	53	Cross	33	30,000	33,900	63,900	Double	Ins.Hunt	6–6	36	R.S.	West.317	K-34
Detroit United Ry. (23)	Int.	Closed	1910	Single	No	46–4	5–1	5–1	8–6	12–9¾	45	Cross	32	25,000	31,350	56,350	Double	Ins.Hunt	6 6	33	R.S.	West.317	K-34
NEW YORK																							
Brooklyn Rapid Transit Co. (29)	Elev	Semi-con.	1907	Double	No	48–11	4–3	4–3	8–9½	13–2½	53	Long.&Cross	....	27,080	44,579	71,659	Double	Ins.Hunt	6–8	34	R.S.	West.300	West.M.U
Fonda, Johns. & Gloversville (24)	Int.	Closed	1904	Double	No	55–4	5–0	5–0	8–11	13–9	56	Cross	34	....	....	86,500	Double	Taylor	6–10	34	R.S.	G.E.–73	Type M.
Fonda, Johns. & Gloversville (25)	Int.	Closed	1902	Double	No	45–4	5–6	5–6	8–5	13–0	52	Cross	32	....	....	58,850	Double	Ins.Hunt	6–0	34	S.T.	G.E.–57	K-14
Oneida Ry. (26)	Int.	Semi-con.	1906	Double	No	49–0	....	....	8–6	13–0	52	Cross	33	26,533	52,542	79,075	Double	Ins.Hunt	6–6	37	R.S.	G.E.–73	Type M.
Rochester & Eastern Ry. (27)	Int.	Closed	1909	Double	No	51–3⅜	....	....	8–6½	13–7	52	Cross	....	35,564	52,666	68,230	Double	....	6 6	34	S.T.	G.E.–204	K-34
Utica & Mohawk Valley (28)	Int.	Semi-con.	1901	Single	No	45–8	4–2	4–2	8–6½	13–0	48	Cross	33	21,020	32,515	53,535	Double	Ins.Hunt	6–0	35	R.S.	West.–93	K-14
OHIO																							
Lake Shore Elec. Ry. (29)	Int.	Closed	1907	Single	No	51–0	4–7½	4–7½	8–5	13–10	52	Cross	32½	17,395	55,350	72,745	Double	M.C.B.	7–0	38	R.S.	West 121	Type M.
Lake Shore Elec. Ry. (30)	Sub.	Semi-con.	1907	Single	No	48–6	4–1	6–6	8–9	13–0	52	Cross	31½	22,500	33,000	45,500	Double	Brill-27E	6–6	33	C. I.	West.101	K-14
Nor. Ohio Trac. & Lt. Co. (31)	Int.	Closed	1910	Single	No	60–0	4–6	4–11	8–8½	13–11	52	Cross	....	28,000	52,000	80,000	Double	M.C.B.	6–0	35	R.S.	G.E.–204	B 8
PENNSYLVANIA																							
Pittsburgh Rys. (32)	Int.	Semi-con.	1910	Single	No	52–6	5–6	5–6	8–2	14–2	64	Cross	30	30,000	43,000	73,000	Double	Ins.Hunt	6–6	34	R.S.	West.303	Type M.
WISCONSIN																							
Milwaukee L. Ht. & Trac. Co. (33)	Int.	Closed	1909	Double	No	53–8	5–10	5–10	8–7	12–5	64	Long.&Cross	29½	41,000	39,000	80,000	Double	M.C.B.	6–6	36	R.S.	G.E.–207	M.U.

(22) These cars were described in the ELECTRIC RAILWAY JOURNAL for May 1, 1909, page 828.

(23) See ELECTRIC RAILWAY JOURNAL for Oct. 24, 1908, page 1259.

(24) Illustrated in the ELECTRIC RAILWAY JOURNAL for June 18, 1910, page 1072. Are convertible on one side only.

(25) These cars are equipped with roller-bearing journals and ball-bearing armature bearings.

(26) Semi-steel bodies; rear platform inclosed with folding doors. Have no front platform. Described in ELECTRIC RAILWAY JOURNAL for Oct. 15, 1910, page 834.

(27) Will seat 70 passengers when used as open car. Described in ELECTRIC RAILWAY JOURNAL for Dec. 3, 1910, page 1118.

(28) Has smoking compartment with eight chairs. Observation rear platform; used for limited service.

(29) One motor and one trailer truck. Trailer truck has 31-in. wheels and 5-ft. 6-in. wheelbase.

(30) These cars were described in the ELECTRIC RAILWAY JOURNAL for July 16, 1910, page 103.

TYPES OF CITY CARS

Four types of city cars, closed, semi-convertible, convertible and open, are represented in the table. Closed cars with single sashes, either raised part way into pockets back of the letter board or dropped completely down into pockets between the side panels and the inside lining, are being built in the largest numbers, but the semi-convertible cars, which are equally well adapted to winter and summer service, are displacing open and closed cars on many roads. Open cars have the two advantages of large seating capacity and light weight, but they represent an idle investment for six months in the year and require storage under cover when not in use. The semi-convertible car permits prepayment fare collection at all seasons of the year and eliminates the danger from accidents to persons on the running board. The semi-convertible suburban cars of the Capital Traction Company are of a type which combines the advantages of cross-seats, prepayment fare collection, inclosed platforms and in summer as free circulation of air as can be had on an open car owing to the absence of the end bulkheads in the car and the use of drop sashes in all the platform windows. The Third Avenue Railroad cars are another type which is equally well adapted to congested city service in summer and winter. On the Pacific Coast the so-called California-type car, in which about half the seats are in an open-side section and the remainder are in a closed section, is used in large numbers, both for city and interurban service. This type of car is adapted only for mild and equable climates and has not been used in the Eastern or Northern States. The one-side convertible cars of the Northern Ohio Traction & Light Company are adapted only for single-end operation. The cross-seats are made in a long section against the closed side and a short, removable section against the open side. When used as a closed car the short sections are removed to form an aisle along the side of the car.

SEATING ARRANGEMENT

The use of cross-seats with a narrow center aisle instead of two longitudinal seats and a wide aisle is now quite general for city cars. Experience with semi-convertible cars with cross-seats demonstrated the feasibility of handling heavy loads in spite of the narrow aisle, and the greater comfort of both the seated and standing passengers was an argument in favor of cross-seats. The strongest objection to the narrow aisle was that it retarded the conductor in collecting fares and caused him to jostle the standing passengers as he moved backward and forward through the car. The prepayment method of fare collection overcomes this objection.

The semi-steel cars of the Pittsburgh Railways have a longitudinal seat along one side and cross-seats on the opposite side separated by an aisle 37-in. wide as compared with a 22-in. aisle on cross-seat cars of the same width inside. The arrangement of seats near the entrance and exit doors is an important detail and a wide variation is found in cars of the same general type. In the semi-convertible pay-as-you-enter cars of the Third

Avenue Railroad there are 10 cross-seats on each side of a 30-ft. body and folding double longitudinal seats are placed in each of the four corners adjoining the entrance and exit door openings. This arrangement provides the maximum possible number of cross-seats without interfering with the free movement of passengers in or out at either end of the car. The other extreme in a cross-seat car is found in the single-end cars of the Indianapolis Traction & Terminal Company, which have six cross-seats on each side at the forward end and two longitudinal seats 13 ft. in. long at the rear. The longitudinal seats of the Metropolitan Street Railway cars are cut back about 3 in. for a distance of 30 in. away from the bulkheads so as to increase the width of the aisle near the end doors.

The spacing of cross-seats longitudinally, as shown in the table, varies from 29⅜ in. to 33 in. The usual allowance of 16 in. of length per passenger in longitudinal seat cars compares with a 32-in. spacing for cross-seats. There is a tendency to increase the distance between seats, especially in cars used for long runs on account of the greater comfort of passengers. While a difference of 1 in. or 2 in. in the seat spacing does not appear to be important it affects the entire body framing and must be taken into account in making comparisons of weight and seating capacity per foot of body length.

The desire to provide as many seats as possible has led to the use of folding seats on the platforms. The Birmingham single-truck cars and the prepayment cars of the Metropolitan Street Railway and the Third Avenue Railroad, among others included in the table, are provided with seats of this kind. From four to six passengers may be seated on the front platform of a car without interfering with the motorman or the exit of passengers. The latest Pittsburgh cars have no front platform; the longitudinal seat on the left-hand side is carried forward to the extreme end of the car and the motorman is separated from the passengers only by a pipe railing.

PLATFORMS

Before the introduction of the prepayment method of fare collection the ordinary length of platforms on closed cars varied from 4 ft. to 5 ft. This has been increased in most prepayment cars to from 6 ft. to 7 ft. 6 in. The earlier designs of prepayment cars had excessively long platforms, but experience has shown that the successful operation of cars of this type does not require platforms longer than 6 ft. The all-steel, single-end, pay-as-you-enter cars put in service in Montreal in 1907 had rear platforms 9 ft. 8 in. long, and the pay-as-you-enter cars of the Cleveland Railway, built in 1908, had platforms 8 ft. long. In contrast with these long platforms may be mentioned the single-end pay-as-you-enter cars of the Detroit United Railway with 5-ft. 10-in. platforms and the Jacksonville pay-as-you-enter cars with 5-ft. platforms. The latter cars, however, have the bulkheads set in about 20 in. from the corner posts. The platforms of the Capital Traction Company's pay-within cars are 5 ft. 7 in. long.

The maintenance of long platforms supported by wooden sills bolted and clamped to the body underframing is a serious problem, and in most of the recent designs of long-platform cars metal side knees carried well back toward the body bolsters have been used. One prominent car builder employs two channels bent to the proper shape and bolted together with spreaders to form a shallow truss, while another builder uses riveted plate girder knees.

The arrangement of platform steps, doors and gates, partition railings and body end doors of prepayment cars is very varied. Hardly any two designs of cars built during the past year have been alike in this respect. The individual ideas of the car builders and their customers have largely governed the design of platforms. The patent situation with regard to the details of prepayment platforms is very complicated, and to some extent, at least, has been responsible for the numerous designs now in use. It is interesting to note in this connection a marked tendency toward the use of platform doors or gates as a means for effectually preventing boarding and alighting accidents.

CAR FRAMING

In nearly all of the recent types of double-truck cars more or less steel has been used in combination with wooden members for the underframing and body framing below the window sills. All-steel construction has not yet been developed to the point where it can compete in first cost and low weight with wooden construction reinforced with steel. Unlike a steam railroad car body, a street car is not subjected to severe draft stresses which must be transmitted from end to end through the underframing, nor is it necessary to provide great strength against collisions. On the other hand, it is subjected to severe longitudinal stresses due to the rapid and constant acceleration and braking, and also to severe transverse stresses when passing around sharp curves. Utilization of the strength of the car side below the windows to carry the vertical stresses rather than a number of longitudinal sills in the bottom frame has produced greater stiffness for the same or less weight. Where drop sash are used with wood side panels this result is accomplished by introducing a thick steel plate, 10 in. to 12 in. wide, to reinforce the side sills. Overhang and drop truss rods are also employed to stiffen the car side. Diagonal braces in the floor framing are essential in street car construction owing to the cross-bending and twisting stresses set up when running around sharp curves. Some car builders introduce these members at the corners between the bolster and the end sill, while others frame them in the center between the bolsters. They are not so necessary in steel underframes, where gusset plates can be used to stiffen the corners and hold the framing square.

A comparatively recent development in car body framing is the use of cast-steel body bolsters. The loads carried by the side framing must be transmitted to the truck center plates through the bolsters and these members of the underframe must be strong and rigid. The Denver City Tramway has been using cast-steel body bolsters for nearly three years at a considerable saving of weight over built-up bolsters. The 1910 report of the Engineering Association committee on equipment contained an interesting and valuable discussion on car framing in which several principles of design were given.

The problem of reducing the weight of city cars is still absorbing the attention of car builders. Progress is being made

UNIT WEIGHTS OF CARS.

Railway Company.	Weight per Seat.	Wt. per Ft. of Length.	Wt. per Sq. Ft.
CLOSED.			
Birmingham Ry., Light & Power*	831	820	95
United R. R., San Francisco	1105	1125	126
Denver City Tramway, 4-motor	738	874	107
Denver City Tramway, 2-motor	689	816	100
Washington Railway & Electric Co	795	838	101
Jacksonville Electric Co	757	844	98
Georgia Railway & Electric Co	957	830	102
Georgia Railway & Electric Co*	712	632	78
Chicago Railways	1324	1078	131
Springfield Consolidated Railway*	678	550	69
Ft. Wayne & Wabash Valley Traction*	628	627	73
Indianapolis Traction & Terminal Co	1012	931	110
Detroit United Railway	973	989	119
United Railways, St. Louis	993	1050	117
Public Service Railway	1110	984	115
F. J. & G. Railway	1158	1696	129
Metropolitan Street Railway	808	809	98
Cleveland Railway	834	800	100
Philadelphia Rapid Transit	945	859	113
Tacoma Railway & Power Co	622	780	112
Milwaukee Electric Railway & Light Co	960	1000	117
SEMI-CONVERTIBLE.			
Capital Traction Co	934	820	97
Capital Traction Co	1202	1100	126
Chicago & Milwaukee Electric Railway	1000	1059	124
United Railways & Electric Co	1000	960	118
Boston Elevated Railway	1019	1098	127
Boston & Northern Street Railway	1070	1083	128
Grand Rapids Railway	951	736	81
Twin City Rapid Transit	923	998	119
Brooklyn Rapid Transit	975	920	115
Rochester Railway	1156	1092	131
Syracuse Rapid Transit Railway	1242	1162	137
Third Avenue Railroad	763	854	98
Pittsburgh Railways	842	1028	128
San Antonio Traction Co	1018	914	112
Utah Light & Railway Co	1090	1090	128
OPEN AND CALIFORNIA TYPE.			
Los Angeles Railway (Cal.)	817	816	99
Northern Electric Railway (Cal.)	817	915	110
Northern Electric Railway (Open)	357	761	94
Boston & Northern Street Railway	517	886	98
Coney Island & Brooklyn	386	643	74

*Single-truck cars.

in the direction of eliminating unnecessary weight in the innumerable small parts not subjected to severe stresses rather than in the principal members of the framing, where both strength and stiffness are essential. Studies of detail weights, such as have been made by the Boston & Northern Street Railway and other companies have furnished data which have never before been in the hands of the designers of cars. Even the car builders did not know the weight of the cars which they built a few years ago. The effort to reduce weights has been directed chiefly toward the car body, but it will be observed from the table on pages 22 and 23 that the weight of the trucks and electrical equipment in most cases exceeds the weight of the body. There is an opportunity for reducing the weight of these parts also.

Comparisons of car weights should take into account conditions of climate, schedules and track. The weight per seat is perhaps the most common basis of comparison, and weight per foot of length and weight per square foot of floor area have also been proposed as units. In the accompanying table of unit weights of a number of cars of recent design the comparison has been made in each of these three ways. The weight used in each case is the total weight of the car, trucks and equipment. The length is the length over bumpers and square feet of floor area was computed by multiplying the length over bumpers by the width over belt rail.

The wide variations in these ratios are apparent from an inspection of the table. The weight per seat for closed cars varies from 622 lb. to 1324 lb. Single-truck cars weigh per seat nearly 40 per cent less than the average for double-truck cars, while open cars weigh as low as 357 lb. per seat. The two-motor and four-motor cars of the Denver City Tramway have the same bodies and trucks, but the difference in the weight of the electrical equipment alone is reflected in a striking manner in the three ratios which are given in the table on page 25 of this issue.

APPLICATIONS TO BUILD TRACKLESS TROLLEY LINES IN GREAT BRITAIN

Sixteen applications have been made to Parliament for powers to establish trackless electric railways in various localities throughout Great Britain. Some of these proposals are from local authorities, some from existing tramway companies and others are from companies formed expressly to build trackless lines. Leeds, Bradford, Sheffield and Newcastle have already received permission to operate trackless tramways and powers are being sought by the Northampton Corporation, Halifax Corporation, Malvern Electric Traction Company, Matlock District Railless Traction Company, Brighton, Hove & Preston United Omnibus Company, Aberdare Urban District Council, the Macclesfield & District Railless Electric Traction & Electricity Supply Company, Rotherham Corporation, the Croydon & Southern District Railless Electric Traction Company, Newcastle-upon-Tyne Corporation, the Western Valleys (Monmouthshire) Railless Traction Company, the Rotherham, Maltby & District Railless Electric Traction Company, the Oldham & Saddleworth District Electric Railless Traction Company and the Chiswick Urban District Council. At present no trackless trolley systems are operated in Great Britain.

Attorney-General O'Malley, of New York, after reviewing the work of his department during the year, recommends that power to equalize special franchise assessments should be given to the State Board of Tax Commissioners, thus rendering it unnecessary to apply to the courts, the latter having decided that special franchise assessments must be equalized at the rate at which local real property is assessed. Mr. O'Malley also urges an amendment to the tax law providing that the occupation of a highway by a public service corporation shall be prima facie evidence of the existence of the special franchise.

THE AMERICAN ELECTRIC RAILWAY ASSOCIATION

BY ARTHUR W. BRADY, PRESIDENT

The American Electric Railway Association represents a growth of more than a quarter of a century and now embraces within its membership all classes of electric railways, surface, elevated and subway, urban, suburban and interurban, as well as partially electrified steam railroads. It owes its existence to the principle of co-operation that has played so large a part in the advancement of the material growth and prosperity of this continent. The principal questions confronting the electric railway industry in policy, management and operation are much the same north and south, east and west. The trend of events is to increase the similarities, rather than the divergencies, in these questions. It is obvious that the substantially identical problems constantly presented for solution at points hundreds or thousands of miles apart can be solved most wisely and permanently through the co-operation of all affected by them, so that the conclusion reached by one management may represent the combined thought and experience of many. The American Electric Railway Association is intended to afford the opportunity for this necessary co-operation. The measure of its success is the extent to which it has furnished and is furnishing this opportunity.

The objects of the association are largely accomplished through its affiliated associations, the Engineering, Claim Agents', Transportation & Traffic, and Accountants' associations, which deal with practical questions affecting all branches of electric railway operation. The high quality and the amount of work which these associations have done in the past demonstrate the standard which these bodies have set for themselves. The work planned by them for the coming year will open up some new fields and add to results accomplished in old ones.

The work of the parent association is naturally of a different character from that falling within the scope of the affiliated associations. It affects the industry at a different angle. Generally speaking, the parent association deals, on the one hand, with those problems which affect the fundamental relations between the electric railway industry and the public, and, on the other hand, with those internal concerns of electric railway management which affect the business as a whole, rather than some particular part or department of it.

A brief reference to part of the plans which have been laid for the coming year will indicate some of the things that the association is doing.

Of the questions affecting the relations between the companies and the public none is more important than those relating to the permanence and terms of franchises, without which electric railroads cannot exist, and to the kind, extent and method of public regulation. The determination of all such questions under a popular form of government depends finally on the views which the public shall adopt concerning them. The education of the public to the point of a correct conclusion has not been accomplished in some prominent instances without extended periods of stress and struggle, costly, if not disastrous, to both railways and public. There should be some better method of arriving at correct views. War in industrial affairs is to be deplored almost as much as in affairs of state. In either case victory is determined by force, not reason and justice. There is no reason for wonder at the universality with which false views on electric railway affairs have been entertained by the general public. The sincere enthusiasm of honest promoters, combined with extraordinary profits, real or apparent, of earlier years, tended to create the belief that every franchise was a mine of wealth. Disillusionment on the part of owners and managers came quickly, as the concurrence of shrunken income and extended rides was disclosed, and as demands for extensions and improvements, for renewals and replacements had to be met. The general public, however, knew little of these developments and has often continued to cling to the old view. Recog-

nition of the mutual interest of public and company, and of the fact that an unfair and excessive burden upon a company will necessarily at some time and in some way be shifted to the shoulders of the public, has made way with discouraging slowness.

This question of fostering the formation of correct views on all matters relating to franchises and regulation will engage the especial attention of the association during the present year. Work done in this direction comes within the purview of the committee on public relations. It is expected that part of the results of its labors will be submitted to the members of the association before the winter is over.

At the recent convention in Atlantic City two subjects were decided to be of sufficient importance to require the appointment of additional committees to consider them particularly. One of these subjects is that of taxation. An exhaustive report read at the convention disclosed the heterogeneous character of the systems—if they may properly be called such—for the taxation of electric railway properties. The burden of taxation is a heavy one for every company and rarely can it be reduced, even when business conditions necessitate the cutting down of every other item of expense. The importance of the subject is so clear that unquestionably the convention acted with wisdom in authorizing the appointment of a committee to give it attention. The committee has been named, and the plans for its work are being laid.

The other subject referred to is that of the proper basis for the determination of rates and fares. This subject is of fundamental importance, the success of even the most favorably situated companies depending on the correct solution of the problem presented. In these days, when the fixing of rates and fares by legislatures, commissions and municipal bodies is constantly up for decision, the matter is of more than usual importance. The committee to consider this subject has been appointed and its work is under way.

The association will continue to give attention to matters affecting the relations between electric railways and the federal government. The increased number of matters at the national capitol which the committee on interstate commerce commission affairs has been forced to look after has caused a change of name to that of the committee on federal relations. The increased powers and duties of the Interstate Commerce Commission are of themselves likely to multiply the matters before the commission itself requiring the attention of the committee. In addition to these, and to matters of federal legislation, attention must be given to the two commissions authorized at the last session of Congress, one to deal with the regulation of capitalization and the other with employees' compensation. It may be found wise to arrange for hearings on behalf of the association before these commissions.

Arrangements have been made to keep member companies advised of proposed legislation affecting those electric railways engaged in interstate commerce and therefore subject to federal legislation. The number of such companies is now large, and even those not subject to the interstate commerce acts have an interest in legislation of this character, for it is likely to serve as a model for State legislation.

Another item of general interest relating to the federal government is that of compensation for carrying United States mail. This matter stands apart from other federal affairs and falls to the charge of another committee. This subject will receive renewed attention during the year, and it is hoped that some real progress will be made.

The highly practical value of the work which the association has already done through its committee on insurance is generally recognized. This committee will continue its efforts, and hopes to put into workable shape certain plans which it has developed and which it believes will accomplish important results for the industry.

The association has at all times taken an interest in matters affecting the welfare and the training of employees. It is well understood that opportunity exists for the accomplishment of valuable results on both of these lines. This is work which an international organization such as the American Electric Railway Association is especially fitted to do. The committees which have this work in charge will continue to give it attention with a view to reaching practical results.

In all of its work the American Association is proceeding in a spirit of close co-operation with the various State and district associations. These associations and the American Association have but one common purpose—the advancement of the electric railway industry. This being so, the work of all should be so planned and carried out that, as far as possible, each will support and supplement the other. With this end in view, the practice was first instituted last year, and will be continued, of placing on the committee on public relations the presidents of these various associations. The field of this committee's work is so broad and important that any conclusions reached should be much more than a reflection of local views. Assurance that this will be the result is given by the widely representative character of this committee brought about by the practice referred to.

The extent to which the association can accomplish all that such an association should accomplish depends largely on the degree of unanimity with which it has the support of the electric railway industry within its territory. This support has always been freely given to the association, but there are still a number of companies which should become active members, and a much larger number of individuals who should become associate members. The committees on active membership and associate membership respectively are planning active campaigns, and by the next convention the association should be more nearly representative than ever before of the entire electric railway industry of the United States, Canada and Mexico.

Last January, for the first time, a mid-year conference was held at the offices of the association in New York. This practice will be again followed this year, and Jan. 27 has been fixed as the date. The sessions at this conference are executive in character, and the opportunity is presented to discuss freely some of the more important questions relating to electric railway companies. The success of the conference last January demonstrated the wisdom of the innovation, and all signs point to a meeting fully as successful on Jan. 27. Assurances have been given of the presentation of matters which will be of unusual interest and profit to all who attend.

It is the belief of those who have closely watched its progress that the association is year by year becoming a more potent instrument for good to electric railway companies, whether members or not. Every year should mark a decided gain, not merely in the numerical and financial strength of the association, but also in the beneficial results which the association is accomplishing for its members. If the plans which have been partially outlined above are carried out, as it is expected they will be, the present year will mark such a gain.

ELECTRIC TRACTION IN SPAIN

The society Hijos de Francisco Gambus Solex has applied to the Governor of Barcelona for authorization to build an electric station for the supply of light and motive power in Olesa de Montserrat and to a factory in Monistrol. The "Linea de Barcelona al Vallés" is the title of another Barcelona company just formed to construct tramways for linking the towns named. A third Barcelona company, styled "la Sociedad de Tranvais de Barcelona á San Andrés," is seeking a concession to build an extension to San Andrés from the Horta terminus of the Barcelona to Horta electric line.

Governor Marshall of Indiana presented his address to the State Legislature on Jan. 3, 1911. The only recommendation by him which affects the electric railways relates to the advisability of passing a law to give interurban railways the right of eminent domain to remove obstructions near the right-of-way which interfere with the view of the crews of cars.

AMERICAN ELECTRIC RAILWAY ENGINEERING ASSOCIATION

BY W. J. HARVIE, PRESIDENT

During the last few years the American Electric Railway Association and its affiliated associations have been progressing wonderfully, and in no case is this progress more noticeable than in the Engineering Association. The work done and the results produced have increased in volume and value to such an extent that the problem of providing time enough both for the work of its committees and for the proper handling of the committee reports is becoming a very serious one.

It is needless to review the stages by which this has come about. Suffice it to say that if the present rate of increase continues (and there appears to be no reason for assuming otherwise) some very radical departure from present methods for conducting the association work must be devised in order to provide the time required and to obtain the best results.

The work of the past year has been very gratifying, and has resulted in the crystallization of a number of matters that have previously been before the association, among them the matter of laying out definite lines of procedure for the main portion of the association's work. The method of adoption of standards was most thoroughly investigated and the general plan previously laid out continued. A committee appointed for the purpose is at present engaged in further amplifying the present scheme. The work this year will follow strictly the outlined procedure, and should therefore be even better than that of last year.

The matter of ratification of standards and recommended practice by the American Association by letter ballot instead of by acclamation on the floor of convention is a step which is in line with the best practice of older associations, and should inure to the benefit of all concerned.

The American Association and its affiliated bodies stand first of all for the advancement of the electric railway industry, and from this viewpoint welcome most heartily the various inquiries and suggestions which have come to them recently from similar national or State organizations and contemplate the cooperation with them of this association. Joint interest established along the broad lines of betterment of the industries so represented cannot but work to the advantage of the organizations concerned. The American Electric Railway Engineering Association may be relied upon to co-operate fully on any subject so far as it is in its power to do so on any basis that is reasonable and equitable. That a great amount of good can be accomplished by a closer relationship with other like associations cannot be questioned.

A glance at the work for this year as laid out shows that it includes the investigation of some very important subjects, and the personnel of the various standing and special committees is assurance that the investigations of those subjects which are taken up will be most thorough. It was this year deemed wise to increase the membership of the various standing committees by 50 per cent, thus increasing the number of members on each committee from six to nine. This increase of membership is a most important move, and makes possible the opportunity for a broader vision and a more thorough investigation of subjects, both of which will make the deductions and recommendations of committees and of this association of more value than ever before. This enlargement of committee membership should be carried still further from time to time as the association progresses and the industry develops. This year the additional appointments were made for one, two and three years' service. This arrangement retires three committeemen each year, and the three new appointments in future years will be made for three years each.

The appointment on committees of associate members who may not be connected with member companies has resulted in benefit to the association in several ways, and is also an argument in favor of the increased size of working committees as well as for an increase in associate members. The increase in number of associate members during the last year sets a high mark for this year's associate membership committee, but the rearrangement of this associate membership committee work, by which each of the affiliated associations will have its own committee on associate membership, should noticeably increase the efficiency of this branch of the work.

The engineering association was never in better condition than now to produce the best results with its organization. It is safe to say that it has before it this year more live subjects than ever before, as well as the best facilities for investigation of these matters that it has ever had. Developments are occurring so rapidly that it is extremely difficult to keep abreast of the advance, to select the important matters and to treat them rapidly enough and with sufficient care to make the conclusions both valuable and timely. It is only by broadness of view, co-operative effort and business methods that this can be accomplished, and these conditions we are more nearly approaching each year. This year will, without question, add its full share of advancement to the total progress of the Engineering Association.

THE AMERICAN ELECTRIC RAILWAY ACCOUNTANTS' ASSOCIATION

BY WILLIAM H. FORSE, JR., PRESIDENT

The first recorded meeting of a national body of street railway accountants was the one held at Cleveland, Ohio, in March, 1897, when the Street Railway Accountants' Association of America was organized. This was the predecessor of the organization known since the Atlantic City convention of 1910 as the American Electric Railway Accountants' Association. The arch which spans the years between may be said to represent the development of street and interurban railway accounting in America. At that first meeting the organizers wisely selected as the keystone of the arch, "A Standard System of Accounts and Form of Report." This keystone has well fulfilled its purpose by serving as a strong center about which are grouped the other features of the association work.

The association's committee on standard classification of accounts and form of report has rendered valuable service during the past decade. It has assisted the electric railways of the country in bringing order and uniformity out of what was formerly chaos in records and accounts. The committee is still actively engaged in constructive work. When the Interstate Commerce Commission was preparing the classifications of electric railway accounts which became effective on Jan. 1, 1909, the committee was in session for days at a time with representatives of the commission, and the commission makes acknowledgment in its printed classifications of the aid rendered by the committee in formulating these systems of accounting.

As an outgrowth of the committee's assistance in the preparation of the Interstate Commerce Commission classifications there is at present a permanent working arrangement between this association and the commission. The arrangement provides that when any electric carrier submits a question under the classifications of the commission the question and the proposed reply of the commission shall be first submitted to the members of the classification committee. Each member of the committee considers the question and if any inconsistency or unreasonableness is manifest in the proposed reply the subject is further discussed and a unanimous opinion agreed upon before the reply is finally sent to the railway and the case embodied in the official bulletins of the commission. The arrangement has resulted in decisions which are practical rather than purely technical. Every railway is benefited by the clearness with which perplexing questions are interpreted.

During the past two years valiant work has been done by a committee of our association working jointly with a committee of the Engineering Association. The appointment of this committee was an expression on the part of the associations of

the desirability for a closer working relation between them. At the 1908 convention the president of the Engineering Association delivered an address on the relation between the engineering and accounting departments which indirectly brought about the appointment of this committee. The report presented by the committee at the 1910 convention treated in an able manner the subject of cost accounting as expressed by subdivisional accounts, shop orders and the detail forms and records in connection therewith. The committee has been enlarged and continued during the coming year, and it will continue to accumulate data of value to the member companies of the association. Power costs, shop records which shall provide reliable units for ascertaining costs of repairs, and the broad field of manufacturing cost, with due regard to overhead charges, are a few of the studies which will probably engage the attention of the committee.

At the first convention of the Transportation & Traffic Association, which was held in 1908, a paper on the subject of "Freight and Express Traffic" was presented and discussed. The importance of uniformity in accounting for the revenue and expense of this service was at once recognized and much interest was manifested in considering the bases from which to arrive at the proper conclusions. The same subject was discussed in the 1909 and 1910 conventions of that association and it has been constantly realized that the subject is one of great importance. In view of the experience of the steam railroads in endeavoring to secure adequate cost records of particular classes of service it is not at all unlikely that considerable difficulty will be encountered in blocking out a system of accounting for the purpose of arriving at the real cost of handling freight and express traffic on electric railway lines. Nevertheless, it is a fact that if a uniform plan is agreed upon and consistently adhered to by the numerous electric railways engaged in this business, it will greatly assist the owners and executive officers in making comparison year by year of widely separated properties operating under different conditions. To gather all possible data upon this subject a joint committee composed of three members of the Transportation & Traffic Association and a like number of accountants has been appointed with instructions to prepare a report for the next convention. The task of the committee will primarily be to outline a plan that can be used by electric railways in uniformly computing the revenues and expenses of freight and express traffic.

The work of the joint committee will no doubt be facilitated by the special investigations to be made by the newly appointed committee on car miles and car hours. There is a wide field of usefulness for this new committee. It is impracticable and of little worth to make comparisons of costs per car mile and revenue per car mile without taking into consideration the varying factors which go to make up the unit. For example, the mile made by a heavy interurban motor car and the same distance traversed by a single-truck small-town car or by a modern prepayment type car of the large city cannot be intelligently compared unless tonnage and other features are taken into consideration. There must also be considered the trailer car mileage, non-revenue mileage, etc., in order to secure valuable data. The new committee on this subject will investigate and make recommendations for uniform practice in the preparation of such statistics.

The interurban lines which exchange traffic, both freight and passengers, have received particular attention from the committee on interline accounting, which presented a report at the 1909 convention outlining a system of accounting for interline transactions. The committee has been continued for the coming year and will take up the new problems which arise in connection with this subject. Attention will also be given to details not mentioned in the 1909 report, which was a general treatment of the subject.

It has been the policy of this association to study some phases of accounting through the appointment of committees, while other subjects are treated in the form of papers prepared by accountants who are qualified by experience to present valuable ideas. It has also been occasionally found advisable to invite persons outside of the association to contribute to the convention programs. It had been planned to have a paper on the subject of "Overhead Charges" by Dean M. E. Cooley, of the University of Michigan, at the 1910 convention, but the author was unavoidably detained. This is a subject of considerable interest to accountants and may be discussed at the next convention. Two of the papers which were read at the last convention had not been printed for distribution at the convention, as is customary. These were the papers entitled "Accounting Features of the Cleveland Street Railway Franchise," by Henry J. Davies, secretary Cleveland Railway Company, and "Census and Electric Railway Statistics," by W. M. Steuart, chief statistician for manufactures, Bureau of the Census. The papers contained so many valuable data that they have since been published in one pamphlet and distributed to members of the association.

Our executive committee will meet during the latter part of January and until then no definite plans for the next convention program can be announced. It has been suggested that a paper describing the problems in the accounting of a small property will be interesting, because of the ingenuity required in simplifying records and forms. Methods adopted through sheer necessity for simplicity are sometimes found surprisingly valuable as eliminating waste and shortening labor. The problems of the little company, when well solved, are everywhere interesting, for the accountant who can, with due regard to clarity and accuracy, accomplish most in the elimination of waste and the shortening of labor best deserves the title "American Electric Railway Accountant."

THE AMERICAN ELECTRIC RAILWAY TRANSPORTATION & TRAFFIC ASSOCIATION

BY H. C. PAGE, PRESIDENT

The outlook for the work of the Transportation & Traffic Association in 1911 is most attractive. Although the association is in only the third year of its existence, the importance of its field is being widely recognized, and the large and enthusiastic attendance upon its meetings at the recent convention of the organization demonstrated many possibilities of usefulness to the industry as a whole. An excellent start in the coming year's activities has been made by the executive committee, which met in the general offices of the association in New York on Nov. 22, nearly six weeks ahead of the customary time of beginning preparations for the next convention. Present at this meeting were J. N. Shannahan, C. E. Learned, C. D. Emmons, J. V. Sullivan, A. Gaboury and the writer, only two of the committee members being absent in the representation of the entire country. This full attendance enabled the work in sight to be gone over in a comprehensive manner, and the subdivision of duties among the various committees of the organization was discussed in considerable detail. The executive committee desires to keep in the closest touch with the work of all topical committees and from the beginning has exercised a general direction of activities which will unquestionably tend to bring about positive results through the co-operation of those responsible for the detailed investigation of assigned subjects.

COMMITTEE ON SIGNALS

An important task is to be undertaken by this committee, which has come into being this fall for the purpose of investigating in a broad way the many pressing and interesting problems connected with the safeguarding of traffic. In conjunction with a corresponding committee of the Engineering Association, the committee will make a thorough study of systems of signaling and dispatching in present use on high-speed electric railways throughout the country, including interurban, suburban, elevated and underground lines. Both automatic and manually operated block signaling are to be reviewed, and a special effort will be made to set forth the principles

which bear upon a maximum of safety in the operation of electric railways. The formation of a committee on this subject arises from the belief held by many operating officers that too great a diversity exists in apparatus and methods for the safeguarding of traffic, and that the influence of localities is less important in signaling and dispatching than in many other branches of electric railway service. In other words, given the same conditions of alignment, grade, speed and frequency of cars, a system of signals applicable to the movement of traffic in Ohio ought to be equally useful in New Hampshire or New Jersey. The advantages of taking a few steps toward more standard equipment and methods need not be enlarged upon except to emphasize the tendency toward safer operation which must result from greater uniformity, particularly at intersection points of different railway lines. The use on a single road of a number of signals greatly diversified in type is a source of great inconvenience to transportation employees.

COMMITTEE ON PASSENGER TRAFFIC

On the floor of the 1910 convention the point was well made that too little consideration has thus far been given to the problems of increasing the every-day or routine business of electric railways, in view of the extensive discussions which have centered around the development of pleasure riding, excursion business and extraordinary demands of one kind and another upon the operating organization and its equipment. The executive committee feels that there is an opportunity here for work of the most suggestive character, including the consideration of methods of encouraging short-distance riding, admittedly highly profitable to operating companies, the meeting of competition in local and suburban service, and, in general, the adaptation of transportation facilities to the life of specific communities in such a way as to draw out the highest annual per capita patronage. While the detailed problems which this committee will investigate this year have not yet been set forth, the work will be directed along the foregoing lines in the hope of securing recommendations which will be of value in enabling the member companies to enlarge their regular business and still further to remove electric railway service from that point of view which considers even short rides a luxury, and to bring it still closer to the list of vital necessities of modern life in the public mind.

COMMITTEE ON EXPRESS AND FREIGHT TRAFFIC

The growing importance of electric railway freight and express service renders the work of this committee of great interest to the member companies. The work of the coming year will be directed along the lines of promoting the general advancement of the electric railway as a common carrier within the special fields in which its rapidity, accuracy and reasonable cost of service enable it to perform a unique duty to the community; of bringing home to sections at present without a large express development the results which may fairly be anticipated from such service, and of making a thorough investigation of the various State and municipal requirements and regulations bearing upon this branch of the business. The great variety of regulations now in force in different localities tends to create unnecessary burdens upon the companies and to hamper the full and free development of the service as a highly organized modern convenience. The committee will endeavor to frame a set of rules and regulations which it considers reasonable, and will sift in detail the satisfactory and troublesome features of existing regulations drawn from many parts of the country.

SPECIAL COMMITTEE ON EXPRESS AND FREIGHT ACCOUNTS

At the meeting of the executive committee in New York in November it was voted to form a special committee of three members on the important subject of express and freight accounting. This is now in process. The committee is to confer with the corresponding committee of the Accountants' Association regarding the proper methods of keeping records of the earnings and expenses of express and freight departments, going further into details than was possible in the report of the committee on freight and express traffic to the 1910 convention of the association. It is generally recognized that without a fairly accurate knowledge of the cost of providing specific express and freight services there can be no intelligent development of such business in the future, and no satisfactory basis for the maintenance, change or defense of existing rates. The handling of merchandise within special fields is destined to become a fundamental source of electric railway revenue within a comparatively few years, and the importance of adequate accounting methods particularly suited to the size of the property involved needs no further comment. It is indisputable that not a few companies are at present furnishing the public with an efficient express and freight-handling service without certain knowledge of the extent to which the facilities maintained are profitable. This was thoroughly appreciated by the 1910 committee.

COMMITTEE ON TRANSFERS AND TRANSFER INFORMATION

Important work awaits this committee this year in carrying the report of the 1910 committee further afield, namely, in an investigation of the relation of the transfer to the operation of prepayment cars; in the study of the percentage of waste resulting from the practice of dating transfers and punching out the date before the conductor's period of service begins, and in the study of existing laws relating to the transfer. The able paper on transfers read at the 1910 convention has done much to stimulate work along these lines, and the great importance of the transfer problem in relation to operating revenue and a reasonable return upon the investment in the properties justifies the expenditure of a large amount of time and energy upon it.

COMMITTEE ON TIMETABLES AND SCHEDULES

The work of the past year will be continued by this committee, and some matters of definition will be taken up, notably that of the words "tripper" and "extra," in addition to previous definitions of traffic terms bearing directly upon the important matter of schedules. Other topics to be discussed by the committee will be the best methods of ascertaining schedule speed, problems bearing upon meal reliefs, the revolving extra list, and a complete study of schedules and timetables as applied to interurban railways.

COMMITTEE ON THE TRAINING OF TRANSPORTATION EMPLOYEES

Efforts to improve the quality of transportation employees will constitute the foundation of this committee's work in 1911. The important question of permanent records of trainmen and others will be considered; the determination of the minimum proper breaking-in period for both city and interurban service will be attempted; the maintenance of records during this period, and State and national regulations affecting the employment of trainmen will be investigated. On account of the intimate concern which the public has with the subjects of both this and the preceding committee's work, a thorough study of the topics assigned in each case is anticipated, with permanent recognition of the possible benefits to be gained by the service from the strengthening of weak spots in the selection and training of car service employees.

COMMITTEE ON INTERURBAN RULES

Prepayment car service will occupy a prominent place in the discussions of this committee, and an effort will be made to formulate suitable rules governing trainmen on interurban lines who may be charged with the handling of equipment of this particular type. Conferences will be held by the committee with the committee on city rules, with a view toward eliminating points of conflict in the regulations of operating companies. The importance of governing all trainmen in the same general territory by rules which are consistent with a given operating policy is almost self-evident. Another conference session is planned for the committee with a committee of the American Railway Association, the topic for discussion being differences in the operating rules of steam and electric interurban railways. The possibilities of bringing the rules closer to a common meeting point will be considered, and, if feasible, recommendations will be made so as to take advantage of the best experience of both classes of transportation.

COMMITTEE ON CITY RULES

This committee will confer with that on interurban rules as above indicated, striving to secure a more uniform wording of rules having similar meanings, and endeavoring to improve the service jointly given by interurban and city lines on through routes. In view of the larger use of prepayment cars on city lines, even more attention will probably be given to rules for the operation of this type of rolling stock than was accorded it by the previous committee.

CONVENTION MATTERS

The writer desires to express his commendation of the plan of stimulating the growth of membership through the activity of the branches of the parent organization. The benefits which an associate member obtains for a nominal sum are very great. President Brady's influence in thus subdividing the growth of membership is deserving of much praise. The value of the papers, proceedings and privilege of attending the conventions is far beyond the cost to the associate member.

In conclusion, the writer desires to emphasize the importance of the member companies adopting a liberal policy in sending their men to conventions with positive instructions, in the traffic department, to take part in or at any rate to be in constant attendance upon the meetings of the Transportation & Traffic Association. If possible every man sent from an operating company should figure in some way in the proceedings, at least in attempting to take part in discussions, which are often the most vital features of conventions, since they bring out differences in practice in all parts of the country and enable united action to be taken with justice to all sections. Committee work is exacting and consumes valuable time, but companies which are willing to pay the cost of membership should be willing to do all that they can to insure the highest possible return on their investment. This means that officials should be permitted to take sufficient time from their regular duties to perform committee work, and where this is the practice a long step has been taken toward reaping the full benefits of membership.

THE AMERICAN ELECTRIC RAILWAY CLAIM AGENTS' ASSOCIATION

BY H. V. DROWN, PRESIDENT

The general manager of one of the big street railway systems remarked to a friend at the last Atlantic City convention: "If you want to get on a live wire, drop in at one of the Claim Agents' meetings." Had his friend acted on the suggestion he would have found a body of earnest men who had not left their busy desks at home with a feeling that they were going on a junketing trip at the expense of their companies. On the contrary they had come to the convention to work and learn, and to exchange with each other the results of their observations and experience.

Although the number of claim department representatives at the last convention was the largest since the organization of the Claim Agents' Association, which began with the getting together of a handful of men at St. Louis in 1904, there was apparently not a single absentee at any of the meetings. Could the executive officers of all the street railway companies of the country have attended one of our meetings, as did the general manager referred to, I am sure that each company would have at least one claim department representative at our next convention. It is a significant fact that practically all of the claim agents who have been regular attendants at our conventions and have gone into the work earnestly report a gradual decrease in their expenditures. Certainly no man can stand alone in this or any other complicated business, and the fact that these men have been constantly exchanging their best thoughts and ideas with other men who have been devoting the best part of their lives to the work must have helped them greatly in achieving the excellent results which they have shown. The time has passed when the claim department was frowned upon as a necessary evil and profanely referred to as the "rat hole" of the treasury. Broad-minded executive officers to-day look upon the expenditures for accidents and damages much as they do on taxes or depreciation in rolling stock. They insist, however, that their claim departments be conducted in a clean, thorough and businesslike manner, to the end that the total expenditures for this account be minimized to the utmost and, at the same time, that the business be handled in such a manner as to promote confidence in and respect for the company and that the men engaged in the work be up to the minute with the latest and best methods. No man can keep up to date and fill these requirements unless he profits by the experience of others. To do this he must come in personal contact with the other men in his calling. Therefore, I cannot too strongly urge those claim men who have not attended our meetings to make every effort to join us in our 1911 convention. After they have once attended I am sure they will be with us each year thereafter. It is not likely that the executive officers to whom they report will refuse to send them as delegates if the matter is presented in the right way.

The papers read at the last convention and the discussions thereon were not only exceedingly interesting to members of our association, but attracted wide notice among street railway men in general. These papers were not hastily thrown together at the last moment. On the contrary they were the result of much thought and research. The subjects were assigned to the writers early in the year so that plenty of opportunity was given for careful study and the gathering of data. The subjects committee appointed this year is busily engaged in selecting subjects for papers at the coming convention. The members of this committee are especially well fitted for the work, and an excellent list of subjects will be made up, and men will be chosen to treat them who will furnish papers well worth while. Some of these papers will be founded on statistics gathered from all the member companies. I earnestly urge that all members reply promptly and fully to any inquiries for such statistical information so that the results may be of permanent value to us all.

Our association has endeavored to secure beneficial results for its membership along a number of different lines, but its most conspicuous efforts have been in the promotion of two radical movements, viz., the prevention and proper handling of accidents and the establishment of a national index bureau. The former has already given results of inestimable value in reducing casualties and increasing the efficiency of employees. When more fully developed through the general co-operation of the member companies the index or reporting bureau will without a doubt be the direct cause of substantial reductions in claim expenditures.

A great deal has been said in our conventions and a number of interesting and instructive papers have been written on accident prevention and instruction of employees, but the most earnest exponent of the work, and the man who probably had most to do with promoting it, is F. W. Johnson, of Philadelphia. Although others have done some work in this direction in recent years, he was apparently the first to take it up in earnest and make a comprehensive study of it, and many of his methods were entirely new. The results which he obtained in increasing the efficiency of employees, reducing accidents and increasing the number of witnesses obtained to accidents are now generally known. A great many companies, and practically all those that have had claim representatives at our conventions, are now carrying on this work in some form or other with marked success.

The movement for a national index bureau, more recently put into effect, has been for many years the claim agent's dream, but ways and means of establishing it were not in sight. It was with the idea that some plan could be devised for bringing it about that a few claim agents met in St. Louis in 1904 and

organized what is now the Claim Agents' Association. Nothing concrete was accomplished, however, at that time, as we were then not connected with the American Street & Interurban Railway Association, and our members lacked the full support of their employers. After our association was affiliated with the parent body, the proposition began to tak form. Each year the desirability of a central reporting bureau which would be available to every member company was discussed. All agreed that such a bureau would be of tangible value and give the members something to which they could in later years point with pride and with satisfaction. All along H. R. Goshorn, general claim agent of the Philadelphia Rapid Transit Company, had taken a most active part in promoting the project, and naturally when a committee was chosen in 1908 to look into the matter he was put at its head. He devoted a great deal of time to a study of the situation, and it was through his efforts that the officers of the parent body became interested and were persuaded to give it moral and financial support.

Mr. Goshorn, as chairman of the index committee, reported to the 1909 convention at Denver that it would be more feasible and practicable for us to accept a very reasonable proposition made by the well-known and long-established Hooper-Holmes Information Bureau, of New York City, than to attempt to establish and maintain a bureau entirely of our own. Aside from the question of economy, a great incentive for accepting the Hooper-Holmes service was the fact that it had for many years maintained a bureau including practically all the accident insurance companies, most of the steam railroads and many of the trolley companies, thus covering the entire country, and that from these companies it already had in its files over 1,500,000 names of persons who had presented claims in accident cases. The proposition of this bureau was that, providing the parent body would contribute $500 per annum, the bureau would index all claims reported to it at the rate of 5 cents each and would report immediately any duplicates found, giving the names of the companies against which claim or claims had been presented. The claims were to be reported by the various roads direct to the secretary of the American Electric Railway Association (H. C. Donecker, No. 29 West Thirty-ninth Street, New York City), who would, in turn, refer them to the bureau, the bureau to look to the secretary for payment. The secretary, in his turn, would bill periodically the companies reporting. The parent body looked so favorably upon the proposition that the executive committee voted to subscribe the $500 per annum. The proposition approved by the Claim Agents' Association was accepted by the parent body, and the bureau is now in active operation. Any claim agent, or other claim representative of a member company, can now report his claims to the secretary, giving claimant's name, age, residence, occupation and date of accident, and he will immediately be notified if duplicates are found showing that any claimant has previously been reported as having had a claim or a damage suit.

To make this reporting service a complete success, *every* personal injury claim must be reported. It should be, and by this system can be, made almost impossible for a duplicate claim for personal injury to be made in this country against a street railway company without the various companies interested being immediately acquainted with the fact. This sounds like a big and expensive proposition, but, on the contrary, when analyzed it is found to be extremely simple and surprisingly inexpensive. The Public Service Railway Company of New Jersey, which I represent, has reported every personal injury claim presented for more than a year past, and although our system is a large one, as we cover practically all of the State of New Jersey, I have found the task of reporting all our claims very simple. It involves but a few moments' work each day and the cost is trifling compared with the excellent results obtained. To demonstrate how inexpensive it is, figure all your personal injury claims for a year at 5 cents each. You will find the total less than you often pay to dispose of one unimportant claim. For the smaller roads the amount is very trifling. In considering this proposition the accident faker, so-called, plays a small part, for there are few such, but there are a great many among the traveling public and those persons who migrate who have been paid by some corporation for injuries real or feigned, and in the event of their meeting with other accidents they are almost sure to attempt to palm off the old injury. Every claim agent knows how effective in settlements or trial is the production of evidence proving a previous injury or physical defect. It often wipes out the claim altogether and invariably reduces it to a minimum.

Of course the longer this bureau continues the more valuable it will be to us, but from the very start it has proved itself to be an exceedingly good investment. The companies who have already taken advantage of it in real earnest report that the help they have received from the accident insurance and steam railway companies alone has paid them many times over on their investment.

There are many other questions bearing on our work that I should like to discuss, but lack of space forbids. I wish, however, in the few remaining lines allotted to me earnestly to urge all claim men to co-operate heartily with one another whenever and wherever possible. If you have witnesses to locate, claims to adjust, or information to be got somewhere out of your territory and in that of a brother claim agent, request him to attend to the matter for you, and, of course, to bill you for any expense incurred. I know it is quite unnecessary for me to ask all claim agents receiving such requests to put forth their best efforts in seeing that the work intrusted to them is properly executed. By co-operating in this manner you will make substantial savings for your companies, and the work will be more satisfactorily handled by the local men acquainted with the territory, conditions and people. Whenever in your travels you find yourself in a brother claim agent's territory, look him up and get acquainted. You will find yourself better off for having done so. Give the various committees and the individual members of our association to whom subjects have been assigned all the help you can in their work. By all means make every effort to attend our conventions. It will give you new life and confidence to mingle with the boys assembled there from all parts of America. You will not only profit by hearing the papers read and discussed, but you will have no trouble in getting some of the boys aside between sessions and threshing out the problems that have been troubling you most. I am sure you will learn something worth while, certainly more than enough to compensate for the expense of the trip, however long it may be, and for the loss of your services at home for a few days.

PAYMENTS UNDER CORPORATION TAX LAW

The annual report of Royal E. Cabell, commissioner of internal revenue of the United States, covering the fiscal year ended June 30, 1910, gives some details of the amounts of special excise tax paid by corporations. The total taxes paid are divided into five classifications as follows: Class A, financial and commercial, $2,663,419; class B, public service, $6,299,046; class C, industrial and manufacturing, $9,130,896; class D, mercantile, $1,731,208; class E, miscellaneous, $1,135,214; total $20,959,783.

The public service corporations included in Class B comprise the following classes of properties: Railroad, steamboat, ferry boat and stage line companies, pipe line, gas and electric light companies, transportation and storage companies, telegraph and telephone companies. The number of returns received from corporations of Class B was 24,252. The amount of capital stock of such corporations was $18,902,060,130 and the amount of bonded and other indebtedness was $14,472,398,675. The net income of such companies for the year was $808,960,651.

ELECTRIC TRACTION IN GREAT BRITAIN

BY A SPECIAL CORRESPONDENT

The year 1910 has not, on the whole, been a bad one for electric traction in this country. The weather, that all-important factor in regard to earnings, though not by any means ideal during the year, was better than in either 1909 or 1908, and the various reports published by undertakings all over the country tell of increased gross earnings. Trade also has improved, and if the Board of Trade returns are to be taken as an index it would seem that we are in for better times. The very first to feel the effects of trade revival are invariably the country's tramways.

Owing to the unsettled political conditions, very few new promotions were recorded, most systems being satisfied to apply for small extensions of their existing lines. The London County Council, as usual, led the way with about 15 miles of new lines, a mileage doubtless small to American ears, but in these strenuous times in England quite a respectable addition.

The first overhead line in Great Britain was opened in Leeds in January, 1893.

STATUS OF EXISTING LINES

The total length of tramways now open for traffic is just over 2500 miles (of which 2360 are electric, 48 steam, 28 cable, 4 gas motor and 84 horse). Of these, 1679 miles are owned by local authorities and 846 miles by private companies. The original purchasing periods under the Tramways Act of 1870 are in many cases nearly reached, and these figures are likely to be changed in the near future in favor of municipalities, although a big field still remains open for private enterprise, by way of joining various systems and extending urban tramways into country districts.

The largest system in the kingdom is that owned by the London County Council, with about 130 miles of route; next comes the Manchester Corporation system with over 100 miles, and next the Glasgow Corporation system with about 95 miles.

The London County Council opened its first line from Westminster Bridge to Tooting in 1903. From that time onward it gradually acquired lines from the old London Street Tramways, the North Metropolitan Tramways, the London Tramways, the South Eastern Metropolitan Tramways, the South London Tramways, the London, Deptford & Greenwich Tramways, the London, Camberwell & Dulwich Tramways, the Woolwich & South East London Tramways, and the London Southern Tramways. These are being gradually electrified, and the lines now owned by the Council consist of about 75 miles on the conduit system, about 10 miles on the overhead system and about 45 miles of horse tramways, including lines in process of reconstruction.

The generating station was partly opened in 1906 and extended in 1909. The plant includes four vertical horizontal reciprocating engines, coupled to three-phase alternators of 3500 kw capacity each, and four three-phase turbo-alternators of 5000 kw each. Substations are scattered all over the districts, provided with motor generators of a total capacity of 43,100 kw, which change the current to 550-volt direct current. The Council has about 1200 cars; the revenue in 1909 was £1,539,434. The car mileage run was about 32,000,000 car miles and 345,000,000 passengers were carried.

One of the features of the year 1910 as regards tramways is the fact that the first lines on the trackless trolley system were sanctioned by Parliament. In 1909 a large number of municipal corporations and companies had applied for powers to run trackless trams. But, as this was a novelty and the powers that be had apparently not come to any definite decision in regard to the procedure to be adopted, the bills were withdrawn and nothing was done. During 1910, however, the towns of Leeds and Bradford obtained their powers, and a considerable number of others are now following suit, including Newcastle, Halifax, Northampton, Brighton and Rotherham.

It is not generally recognized how complete a network of tramways has gradually developed in certain districts, and as an illustration of this it may be stated that a passenger can now ride uninterruptedly by tramcar from Liverpool, through Manchester, as far as Leeds.

Another interesting feature of the times is the supersession by the trolley system of other forms of electric traction where these existed. At Torquay the Board of Trade has quite recently agreed to the removal of the existing surface contact system, and the overhead system is in course of construction. The lines between Rawmarsh and Mexborough in Yorkshire have already been converted. At Hastings the matter is under consideration. At Bournemouth a decision has also quite recently been come to to remove the conduit system and to set up the overhead wires which during so many years it was declared would never be tolerated. Edinburgh, the home of the cable tramways, is building extensions on the overhead system. The Highgate Hill cable tramways, in London, disappeared last year, and slowly but surely the popular trolley is pushing its way into London, where already short bits of lines have appeared, as mentioned above, and powers are being taken to construct more.

PRESENT-DAY PROBLEMS

The antagonism between local authorities and privately owned tramways is gradually giving way to a better understanding. It is felt that the interests of the two as regards tramways are identical on many points, and co-operation and friendly working are becoming increasingly evident. This is due chiefly to the fact that existing tramway legislation bears harshly upon both. The famous veto vested in local authorities, giving them power under certain conditions effectively to block future construction, has long been a bone of contention. At first only the companies felt the pinch. Now, however, when local authorities are promoters as well as companies, the hardship falls upon them as well. The London County Council, for instance, has yearly to face the uncompromising opposition of the neighboring local authorities when seeking to extend, or to unite, portions of its existing lines. This obstruction not only delays the expansion of the tramways, which are badly needed by the public, but it affects the economical working of an imperfectly laid-out whole. There has long been a feeling that the present procedure was unbusinesslike and unscientific, and the Royal Commission on Traffic as far back as 1904 gave voice to this feeling by recommending to the government the advisability of modifying, or of altogether abrogating, the existing veto of the local authorities. No effect has, however, been given to this recommendation so far.

The question of running powers and inter-running is also responsible for bringing former opponents into closer touch, and a policy of mutual "give and take" has in a great number of cases resulted in mutual advantages to both parties.

As the tramways of the country grow older, the all-important question of repairs and renewals forces itself to the front. Every engineer and manager responsible for the financial success of his undertaking is faced with the problem of devising methods whereby the ever-increasing expenditure under these heads may be met by an equivalent increase in earnings or by cutting down the working expenses to the lowest possible minimum compatible with the maintenance of an adequate service. The mere suggestion of increasing fares is invariably met by a storm of protest from both public and press, although it is a fact that the fares actually charged are a good deal lower than the maximum fares chargeable under the parliamentary powers obtained.

Various expedients suggested themselves, such as offering the public inducements to ride by the issue of return tickets at slightly reduced fares, altering existing stages to meet local requirements, issue of season tickets, etc. There was even a suggestion that a new coin of the realm be issued in order to meet tramway requirements. One of the larger undertakings in the kingdom inaugurated a system designated by the name of "fair fares," which is being extensively tried at the present moment. The idea is to issue tickets not, as heretofore, for specific stages, but available from any spot on the line, whence a passenger may ride a given distance for the smallest coin issued,

namely, one farthing. These farthing stages are marked out by a system of painting the poles, and the passenger may ride as many farthing stages as he pleases, thus securing the fullest value possible for his money. The system is reported to be meeting with a considerable amount of success.

In order to reduce working expenses managers have been studying very closely the question of car meters on tramcars. The savings recorded in the amount of current consumed resulting from the use of these instruments are in some cases quite startling. Hour-meters, so popular on Continental lines, were the first meters to be tried, but they are gradually being replaced by watt-hour and ampere-hour meters. It is claimed for these instruments that not only do they very considerably reduce the amount of energy consumed, but that they at the same time teach drivers to drive more scientifically, with the result that great savings are effected in the life of the various parts both of the rolling stock and of the permanent way. It has been stated that whereas 12 months ago only about half a dozen lines used car meters over 60 now use them extensively. One of the latest reports at hand indicates that in the case of a good-sized undertaking the use of ampere-hour meters resulted in a saving in current consumption amounting to £6,000 for the first year. That this is a question of increasing interest to tramway men is clearly shown from the fact that at every recent meeting of the various tramway associations papers were read upon the subject.

Another question of great importance, the solution of which has yet to be found, is that of rail corrugation. This is causing grave anxiety to many managers who are face to face with the unpleasant fact that the life of their rails will apparently be of very much shorter duration than was at first anticipated. Nor can this anxiety be wondered at since the track is the most vital portion of the entire system. The disease, as corrugation is aptly termed, is of comparatively recent date, for although it was known in the old days of steam tramways and railways the introduction of electric traction has enormously increased its evil workings. The subject has also become a "hardy annual" at tramway meetings and congresses, but, although forms of inquiry without number have at various times been issued to managers by the various associations and other technical bodies, no conclusive replies have been forthcoming.

The latest published report of the replies received from over 70 Continental undertakings carries the matter no further, and the consensus of opinion still points to the eight following causes as being the chief offenders: (1) Composition of rail metal, (2) unduly hard metal tires, (3) too sudden application of brakes, (4) rapid acceleration, (5) high speeds, (6) side rolling of cars, (7) curves of large radius, (8) nature of foundations.

It became increasingly evident that the gravity of the subject demands that it should be dealt with scientifically. A combination of the various constituent associations agreed to delegate to a selected body of experts of wide experience the task of thoroughly investigating the whole question, and with that end in view various public bodies subscribed considerable sums of money in order to enable the committee of investigation to carry out the necessary tests and experiments. In England the matter is at the present moment the subject of an extensive inquiry organized by the Municipal Tramways Association, which invited representatives from the other British tramway associations to join in the researches. It is understood that the committee is being financially assisted by some of the leading cities where corrugation is most keenly felt. At a public meeting held not very long ago the general manager of the Glasgow Corporation Tramways stated that corrugations cost it from £10,000 to £15,000 annually.

TRAMWAY ASSOCIATIONS

The tramway industry in Great Britain is served by two associations, the Municipal Tramways Association and the Tramways & Light Railways Association. There is also an Association of Scottish Tramway Managers, the laws of that country relating to tramways being somewhat different from the English law.

The Municipal Tramways Association, as its name implies, is formed of the various municipal tramways in the kingdom, their managers and other officials. It has a membership of about 200. Every year during the month of September this association holds a three days' conference, at which papers are read and discussed. These conferences are very well attended. The corporations of the towns at which they are held offer their hospitality to the members, and this usually includes a public banquet at the town hall. It is this association which is carrying out by means of a special committee the investigation into rail corrugation mentioned above.

The Tramways & Light Railways Association is more catholic in its composition and numbers among its members, in addition to every tramway company in the kingdom, several leading municipal tramways, engineers, officials and manufacturers. It has a membership of from 300 to 400 and has the Duke of Argyll as its president. The work of this association is done by means of special committees appointed to carry out special work and to report thereon to a council consisting of 20 representative members.

Both of the above associations issued in 1908 exhaustive reports on the question of brakes for tramcars, which have since become quite classical works. They have also been instrumental in agreeing with the Board of Inland Revenue on a standard method of assessing tramway undertakings for income tax purposes. One of the special committees submitted a carefully worked out report, with the result that a representative of the Board of Inland Revenue attended some of its meetings, and the above-mentioned agreement was reached. That this has been productive of much good is proved by the fact that two of the leading tramway companies were credited with from £4,000 to £6,000 each, representing moneys paid in excess of the amounts really due to the government in past years, owing to the want of uniformity previously existing in the methods of assessing. Other undertakings were, of course, less fortunate, since it must obviously happen that where no standard exists some benefit while others suffer. Any disadvantages which may have accrued, however, are fully compensated for by the fact that at present each undertaking knows exactly in what form to submit its accounts to the local surveyors.

It may be of interest to describe very briefly the basis upon which this arrangement was arrived at. The life of the permanent way was calculated on a basis of the number of car miles run thereon, working out at 12, 14 or 16 years respectively. A fixed sum, amounting to £4,400 per mile of single track, was then allowed for renewals, as a deduction before arriving at the net amount to be assessed. In addition, allowances of 5 per cent were allowed on the cost of plant and machinery, 3 per cent on cables, etc.

The associations are now engaged upon similar work in regard to the question of rating, and one of the special committees is going into the matter of existing tramway legislation with a view to obtaining amendments thereto which it is hoped may benefit the industry generally.

Another subject being dealt with at the present moment by a joint committee of the Municipal Tramways Association and the Incorporated Municipal Electrical Association refers to the charges to be made for electrical energy. The committee is appointed to consider and report upon a suitable scheme for the measurement of and charging for energy supplied by combined stations to tramway departments and the method of checking the meters used for recording such supply.

It is a matter of great satisfaction that the various government departments meet the representations of the associations with unfailing fairness and courtesy. There have been innumerable cases in which, thanks to the united action taken by tramway undertakings in delegating their grievances to their associations, these have been either redressed or considerably mitigated. It is not surprising that the various government departments should infinitely prefer to deal with one or two thoroughly representative bodies rather than with numerous separate units working unsystematically on different lines.

The value of combined action is so generally recognized that in the last few months a further body has come into being under the somewhat bulky name of the Committee for the Protection of Electrical Interests. This committee consists of some 80 members representing the leading electrical interests in the country. Other institutions and associations, representing special sections of the industry, have joined this committee, which is intended to be the meeting ground for all. One of its first acts was to arrange that a certain number of members of Parliament should be available to represent electrical interests in Parliament in the event of future legislation affecting the electrical industry. The organization is, of course, entirely non-political.

The procedure to be gone through in order to obtain Parliament's sanction to the construction of new tramway lines is both cumbersome and costly, and with a view to simplifying this procedure under certain conditions the Light Railways Act in 1896 was passed. It was hoped that by means of this act the country would soon be covered with a network of light railways somewhat on the lines obtaining in Belgium and other countries, where both agricultural and manufacturing districts are advantageously served to the great benefit of the community at large. The act has now been in force 14 years, but an official report recently published shows that the hopes then raised have not been realized. Out of a grand total of 600 applications for the construction of lines under this act 380 orders were granted, but the records show that of this total only 95 are actually constructed or in course of construction, representing 409 miles laid on private grounds and 327 miles laid on public roads. Of this total of 736 miles 333 miles are electric and 403 miles are steam.

It will scarcely be maintained, therefore, that the act of 1896 has proved an unqualified success. Indeed, the Light Railway Commissioners themselves, in the course of their last report to the government, state that in their opinion the act needs revising.

HEAVY ELECTRIC TRACTION

Turning from tramways and light railways to the heavier lines of electric traction it is evident that in this field we stand on the threshold of very considerable developments.

The last 10 years have completely revolutionized the traffic problem in London, which is now served from end to end by a system of electrically worked tube and underground railways. The two old steam "Circle" lines are now worked electrically, and half a dozen new electric tube lines, having through-booking arrangements with all connecting lines, enable the Londoner to travel from and to any part of the metropolis with ease, comfort and celerity. Above ground, too, the successful experiment of the London, Brighton & South Coast Railway in electrifying its line from Victoria Station to London Bridge will doubtless be followed by other trunk lines in order to deal with the suburban traffic.

The following is a list of the electric railways working in England to-day. They may be classified under the headings of (1) London and district, (2) provincial.

I. THE LONDON AND DISTRICT LINES

(1) The group controlled by the Underground Electric Railways Company of London, Ltd., about 100 miles of line, consists of:

(a) Metropolitan District Electric Traction Company: Opened for traffic in 1884 as a steam line; converted to electric traction in 1905, with a route mileage of 24 miles of double track; 161 motors and 198 trailers; third and fourth rail system.

(b) Charing Cross, Euston & Hampstead Railway: Opened for traffic 1907; 2 circular iron-lined tunnels, 11 ft. 6 in. diameter; 8 miles double track; 60 motors, 90 trailers; third and fourth rail system.

(c) Great Northern, Piccadilly & Brompton Railway: Opened for traffic, 1906; 2 iron-lined tunnels; 9 miles double track; 72 motors, 146 trailers; third and fourth rail system.

(d) Baker Street & Waterloo Railroad: Opened for traffic 1906; 2 iron-lined tunnels; 5 miles double track; 36 motors, 72 trailers; third-rail system.

The power house for these lines is at Chelsea; the total h.t. system when complete will equal 156 miles, or 363 miles, including associated companies. The company also has a controlling interest in the London United Tramways, which operates about 54 miles of tramways in the southwestern suburbs of London and there are through booking arrangements with all connecting railways.

(2) Central London Railway: Opened for traffic 1900; 1 tunnel; 6 miles double track; 66 motors, 172 trailers; third-rail system.

(3) City & South London Railway: Opened for traffic 1890; 2 cast-iron ring tunnels, 10 ft. 6 in. diameter; 8 miles double track; 52 locomotives, 170 trailers; third-rail system.

(4) Great Northern & City Railway: Opened for traffic 1904; 2 tunnels, 16-ft. diameter; 3 miles double track; 32 motors, 44 trailers; third-rail system.

(5) Hammersmith & City Railway: Opened for traffic 1906; 4 miles double track; third and fourth-rail system.

(6) Metropolitan Railway: Opened for traffic originally as steam line, converted into electric traction 1905; 26 miles double track; 130 motors, 210 trailers; third and fourth-rail system.

(7) Waterloo & City Electric Railway: Opened for traffic 1898; 1.5 miles double track; 17 motors, 12 trailers; third-rail system.

II. PROVINCIAL LINES

(8) Lancashire & Yorkshire Railway: Converted to electric traction 1904; 37 miles of route; 62 motors, 52 trailers; third-rail system.

(9) Liverpool Overhead Railways: Opened for traffic 1893; 6½ miles double track; 44 motors, 7 trailers; third-rail system.

(10) London, Brighton & South Coast Railway: About 9 miles of route between London Bridge and Victoria Station; opened for traffic 1909; overhead high-tension transmission system; single-phase, 7000 volts; current taken from one of the London Lighting Companies' power stations. In the 1911 session of Parliament the company will seek powers to electrify a further instalment to the Crystal Palace.

(11) Mersey Tunnel Electric Railway: Connecting Birkenhead with Liverpool; converted to electric traction in 1903; 4½ miles double track; 24 motors, 37 trailers; third and fourth-rail system.

(12) Midland Railway: A section of this company's line was electrified in 1908; about 9 miles double track; run in connection with the electrified Burton & Ashby Light Railways, 10 miles; 3 motors, 6 trailers; single-phase, overhead system.

(13) North Eastern Railway: A section of this company's lines was electrified in 1904 in Newcastle-on-Tyne and neighboring districts; 2 miles of four track, 35 miles double track, 4 miles single track; 62 motors, 44 trailers; third-rail system.

As regards the future, the promotions notified for the year 1911 are more numerous than was the case last year.

Several of the existing electric railways in London are proposing to extend or to improve their systems by junctions with other lines, the addition of new stations, or otherwise. The London, Tilbury & Southend Railway seeks powers to electrify its lines. Between 20 and 30 tramway promotions are announced, some by existing systems seeking further extensions, others by new concerns, the majority of which advocate the railless trolley system. In addition there are about a dozen applications for provisional orders under the Light Railways Act.

THE MANUFACTURING INDUSTRY

The condition in the electrical manufacturing industry in Great Britain during the past year has been far from satisfactory. It has been a season of little work and low prices. Considerable has been done, however, in foreign trade in the sale of general electrical supplies, and the outlook is a little better than it was a year ago. The difficulty in Great Britain at present is that there is too much manufacturing capacity for the demand. If a general electrification of the railroads should

occur during the next five or ten years a great deal of work would have to be done, and this, of course, would put a new aspect on affairs.

THE ELECTRIC RAILWAYS OF GERMANY DURING THE YEAR 1910

BY A GERMAN ENGINEER

During 1909 the financial situation in Germany was so bad that most of the activities of the electric railways in that country were devoted to the maintenance of their properties rather than to extensions. During 1910, however, conditions improved so much that it was possible to build a large amount of new track and to introduce important betterments in rolling stock and equipment. It is fair to say that at this time the financial and operating conditions of the German electric railways are very sound indeed. These conditions are due partly to the stringent laws, particularly in Prussia and Saxony, which contain about four-fifths of all the electric railway mileage in Germany, and partly to the fact that the electric railway equipment business is controlled absolutely by four large companies, whose policy forbids both the manufacture of inferior goods and the encouragement of doubtful enterprises. No review of the electric railway situation in Germany would be complete without referring at some length to these four companies. They are as follows:

The Allgemeine Elektricitäts-Gesellschaft (A. E. G.), including the German branch (Union Elektricitäts-Gesellschaft) of the old Thomson-Houston Company; the Siemens-Schuckert-Werke (S. S. W.), which is a fusion of the Siemens-Halske and the Schuckert Works of Nürnberg; the Lahmeyer-Gesellschaft, of Frankfort-on-Main, which recently combined with the Felten & Guilleaume Cable Works; and finally the Bergmann Gesellschaft, Berlin, which first became noted for switchboard and power station work, but which has been making railway equipments also for several years past. Even these four companies are being subjected to further consolidation. Several months ago the Allgemeine Elektricitäts-Gesellschaft purchased the Lahmeyer Company, and now the Siemens-Schuckert-Werke are contemplating consolidation with the Bergmann interests. Consequently, Germany will soon have only two important firms manufacturing railway apparatus. It is likely that the two companies will divide the territory with one another. All of the original Siemens lines use the sliding-bow collector, while most of the other railways are equipped with the under-running trolley.

The existence of these large companies and their willingness to spend a great deal of money for research gave the impetus to the great electrification plans of the several German State railways. The syndicate which was formed to carry out the famous Zossen tests of 1902 and 1903 no longer exists, but the results of its work are seen in the great projects of to-day. The main reason for the delay in the electrical equipment of the German State railways is the fear that in case of war an electric railway could be put out of operation much more easily than a steam railroad. Another reason is the lack of money. Despite the fact that the German Empire began its existence in 1871 with the French indemnity of 4,000,000,000 francs, the government debt now is fully as large as the indemnity, and little money is obtainable for developments. The large electrical companies have formed banking firms to loan money to the States and municipalities for railway development purposes at 4 per cent, but thus far little advantage has been taken of such offers.

INTERPOLE MOTORS AND DECREASE IN POWER COST

The most noteworthy features of the year in the street railway field proper have been the increase in mileage, the wide adoption of the interpole motor and the abandonment of a large number of small power stations, which have been replaced by large central generating plants. These small stations sold electrical energy at 5 cents to 6¼ cents per kw-hour, whereas it is now possible in many parts of the Empire to buy 6000-volt, three-phase current for 1½ cents per kw-hour, and in some districts like Schleswig for even 1¼ cents per kw-hour. One of the largest of the new power stations is the Upper Schleswig Electrical Works, which were built by the A. E. G. in a great mining and industrial district. This station supplies energy at the rate of 12½ cents per kw-hour for the first 1000 kw-hours, and charges only 1¼ cents for each additional kw-hour. As the conversion cost adds but 15 per cent to 20 per cent to the prices quoted, the average electric railway is now enabled to hire power for less than one-half the former prices. This reduction in power expenses has made possible the construction of a considerable number of new lines.

The interpole motor has also been a factor in encouraging new construction, because its use permits much higher voltages on the suburban divisions. However, it has not been taken up as fully as it deserves. Its advantages are admitted, but its general adoption is delayed because its initial cost is about 15 per cent more than that of the ordinary type. Assuming that a motor car in Germany averages 40,000 car km (24,800 miles) a year, the increased cost means an additional fixed charge of 0.0325 cent per car kilometer (0.62 car mile). But it is also true that the better accelerating qualities of the interpole motor are not appreciated as they should be, despite the fact that they eliminate a great deal of brush and commutator trouble. In short, the further employment of the interpole motor is simply a question of lower prices.

The recent reduction of customs duties has encouraged some American manufacturers of electric railway material to enter the German market, and their advertisements appear quite frequently in German technical papers.

TRACK AND PAVING

Changes in the engineering and operating standards of German electric railways are reflected in the proceedings of the German Street & Interurban Railway Association. These changes include the standardization of rails, the use of new asphalt paving, cement block paving and new rail joints, including welded types, and improvements in motors. The standardization of rails, which has been described in detail in the Electric Railway Journal (see issue for Jan. 1, 1910), was very necessary, as there are still over 100 sections in common use.

The maintenance of asphalt paving constitutes one of the most costly repair charges in the large cities, excepting Hamburg, where the heavy vehicle traffic makes the use of asphalt impracticable. The paving in Hamburg consists of a foundation of concrete about 20 cm (7.8 in.) deep, covered with stone block 18 cm to 20 cm (7.1 in. to 7.8 in.) high. The joints are filled with bitumen. This paving is so durable that in many cases it does not have to be taken up until the stones have worn down to 4 cm (1.6 in.).

The Berlin street railway system finally has received permission to build parked tracks in very wide streets. Various forms of this construction have been described in the Electric Railway Journal for Oct. 30, 1909, and Oct. 1, 1910. During the year several German railways tried the experiment of laying a line of wood block paving along rails in asphalted streets to avoid the disintegration and wear of the paving at the rails, but these experiments do not seem to have proved particularly successful.

Many improvements have been made in rail joints. The Melaun milled head type is widely used and is entirely satisfactory except for its high cost. The Goldschmidt thermit joint has also been perfected within the past year. This joint is used by many of the principal railway systems, which report that the breakages are only 1 per cent or less. It was formerly considered necessary to install expansion joints every 600 ft. to 980 ft., but this is no longer done, as the open joints at crossings and switches permit all the equalization necessary.

The inventors of the electric arc rail welding process have also improved their method, although this system has been

used so far to but a very modest extent. Its advantage is that the various joints can be treated individually so that defects can be corrected at once. Its disadvantages, however, as compared with the thermit joint are that it requires skilled labor and costly apparatus. The oxy-acetylene method also permits individual treatment of the joints, but has been adopted only to a very limited extent because it does not furnish heat enough to penetrate the rails deeply. This process has been found satisfactory for such light work as welding splice bars on joints.

Track construction on longitudinal stringers without ties, common in Germany, has proved unsatisfactory when used in streets with concrete paving. Attempts have been made to provide a stronger construction by using plates or cross-ties at intervals of from 6 ft. to 13 ft., or, in some cases, placing them under the joints only. These changes, however, do not seem to have brought the desired result because the character of the paving does not permit permanent uniformity in construction after service has begun.

CAR SERVICE, INTERURBAN MILEAGE AND FARES

The German municipal authorities, who are noted for their adherence to the letter of the law, are no longer so insistent regarding the conditions under which railways can carry standing passengers. Formerly standing was permitted only under certain conditions, such as inclement weather, after-theater hours, last-car schedule, etc., but these limitations are no longer enforced so inflexibly. The railways are now able to relieve the peak of the load by a little crowding. This crowding, however, is far from being as great as in American cities, because the average German would rather wait half an hour in the rain than travel in discomfort.

The number of miles of interurban railway track in Germany is increasing, principally through the extension of city systems. In some thickly populated districts these extensions now meet those of neighboring cities, so that it has become possible to travel considerable distances by electric railway. These connections have brought a welcome increase in traffic. The prosperity of these suburban and interurban lines is due to the improved economic condition of the people and the increase in the number of native summer tourists.

Fares have been raised in a number of cities, due largely to the fact that the initiative was taken in cities possessing municipal railways. The authorities in these cities have found that it is not possible to give good service at the low fares which many of the privately owned lines have been forced to grant. The increase in fares has been especially welcome, because German railways, like those in America, have had to face the situation of higher wages and increased prices for railway materials.

HEAVY ELECTRIC RAILWAYS

The electrification of the government railways, as previously noted, is making slow progress. The responsible engineering officials are thoroughly convinced of the engineering and financial merits of electrification under certain conditions as developed by their study of the work done in the United States. Their plans are handicapped, however, by their inability to obtain the money, which the government thinks it can use to better advantage elsewhere. The military objection previously mentioned is especially strong because the very lines which could most profitably be electrified are exactly those important highways which the government would want to keep open in time of war. Aside from the Hamburg-Altoona line, which is a local proposition, electrification has been begun on secondary roads only. Thus plans have been completed by the Prussian government for the electrification of the Dessau-Bitterfeld section of the Magdeburg-Leipsic railway south of Berlin. This line will be operated at 15,000 volts, single phase. The experiences gained on this line and on the Hamburg system will form a basis for the electrification of the Berlin belt lines, a project which would require about 250,000,000 marks (approximately $62,500,000).

The Bavarian government is electrifying the Basel-Zell section of the Wiesental Railway for operation at 10,000 volts, 15 cycles.

In addition to the foregoing extensive electrification plans, several German states, notably Prussia, Bavaria and Wurtemberg, are making considerable use of storage-battery cars on branch lines as described in the ELECTRIC RAILWAY JOURNAL for June 18, 1910. Most of these cars have a capacity of about 50 passengers. They are intended for lines of light traffic where only four to six steam trains have been operated daily. Gasoline and gasoline-electric cars have also shown successful results in this work, but the storage-battery cars are preferred wherever power can be bought cheaply and where the grades are not prohibitive. The increase in traffic shows that the public is greatly pleased with these cars. Most of the storage-battery cars are equipped with two 80-hp motors which operate at 310 volts. The latest cars have shunt-wound motors and regenerative control.

ELECTRIC RAILWAYS IN CANADA

BY J. L. PAYNE, COMPTROLLER OF STATISTICS, DEPARTMENT OF RAILWAYS AND CANALS, DOMINION OF CANADA

To the electric railway corporations operating in Canada the year 1910 brought marked and gratifying prosperity. This statement must, however, be accepted in the collective sense. They were not all prosperous. A few of the smaller roads failed to make ends meet and several others managed to show a merely nominal balance; but, grouping the 56 reporting companies together, they did a great deal more business than in 1909, increased their earnings substantially, added to their assets and broadened the foundations for successful work in the future.

Canada is a growing country. With a swelling tide of immigration from Europe and the United States, which this year will reach 325,000 souls, all commercial interests have been stimulated to a high degree. There is activity everywhere. The West—which we boastfully, and quite truthfully, speak of as "the last great West"—is rapidly filling up with sturdy settlers, and the growth of commercial centers is a natural product of pastoral development. Montreal is now a city of 600,000; Toronto has passed well beyond the 340,000 mark; Winnipeg is climbing swiftly toward 200,000; Calgary and Edmonton, nestling in the very shadow of the Rocky Mountains, have passed from the status of prairie towns 10 years ago to the eminence of populous cities. In short, this northland is fairly on the way toward realizing upon her splendid heritage in agricultural, forest and mineral resources. It is reasonably certain that the census of 1911 will reveal an increase in population of 80 per cent within the decade. That would mean between 8,000,000 and 9,000,000 people. The throb of a new life is felt throughout the land, and the Canadian people, at first a little slow to realize that things were at last coming their way, are now, in sheer excess of optimism, refusing to set limitations to the possibilities in any direction.

In this rapid expansion, especially of urban life, one sees the promise of proportionate progress in electric railway interests. Many standards have been proposed to test the advance of civilization. Some have suggested the consumption of soap, and others the use of writing paper. Be that as it may, it would appear to be a safe assumption, in the peculiar conditions of our day, that the application of electric power to the transportation and general economic needs of a community may be taken as the measure of that community's progress. For the present, the electric railway mileage of Canada has this year passed the 1000-mile mark. To be exact, it reached 1,049.07 miles, as compared with 988.97 last year. Of second track there were 95.20 miles constructed. These figures do not include the mileage of lines under construction.

Capital liability reached $102,044,979, representing an increase over 1909 of $10,439,990. Having regard to new lines

being built, to extensions of existing systems and to projects in process of taking positive shape, it may be assumed that investments in Canadian electric railways will mount up rapidly. An increase of 161 per cent in 10 years fairly shows the steady movement which has been going on in this regard throughout the Dominion.

The gross earnings for 1910 amounted to $18,458,816—a betterment of $2,275,853 as against the preceding year. Toward this total, passengers contributed $16,125,995; freight, $575,537, and mail and express, $68,604. Other car earnings reached $51,241, and under the head of "miscellaneous" there came in $1,382,692. Gross earnings have increased by 220 per cent within the decade. The operating expenses for the year were $10,121,781, representing a ratio of 59.4 per cent to total income. This left a net income of $8,337,035. The profits actually earned for the year were $9,572,315; but, as has been said, there were some lines which incurred a deficit. After making deductions aggregating $2,953,759 for taxes and interest on funded debt a balance of $5,383,276 was left available for dividends.

Operating expenses were distributed as follows: Maintenance of way and structures, $797,895.03; maintenance of equipment, $1,532,542.87; operation of power plant, $1,586,927.37; operation of cars, $4,814,761.63, and general expenses, $1,406,943.49. The wages bill included in the foregoing amounted to $6,316,777.20, or 62.4 per cent of the total. This is not up to the proportion established by steam railways, which is somewhat surprising. It may be that the same method of accounting is not observed; but there would not seem to be any specific reason why the ratio of labor to aggregate operating expenses should, in the case of electric roads, fall below the percentage which obtains among other railways. The rates of pay are not by any means uniform. They are considerably higher at the Pacific Coast than the Atlantic, and are also higher in the larger centers than in the smaller. Conductors and motormen receive nearly equal rates, and the maximum is not over 24 cents an hour in Ontario and 32 cents in the West.

The equipment consisted of 3789 cars of all classes, divided up as follows: Passenger cars—closed, 1795; open, 994, and combination, 337. Other cars—freight, 282; mail, express and baggage, 25; combination, 7; work, 87; snow plows, 62; sweepers, 97, and miscellaneous, 103. This represented an increase for the year of 106 closed passenger cars, 130 freight cars, 5 mail and express cars, 8 snow plows, 7 sweepers and 10 miscellaneous cars. It might be said that all the cars added during the year were manufactured in Canada, although the trade returns show a very considerable importation of parts from the United States. Altogether about $3,000,000 worth of motors, generators and electric apparatus of one sort and another was brought in; but it would be impossible to say now much was distinctly for electric railways. The establishment of a large branch of the Westinghouse business in Canada has led to a marked reduction of imports as compared with 15 and 20 years ago.

The addition of eight snow plows and seven sweepers suggests the difficulties which have to be overcome in the Dominion during the winter season. The snowfall in all the Eastern cities, except Toronto, is usually heavy, and when electric lines were first mooted in Montreal, Ottawa and other centers capital was exceedingly shy because of the well-founded fear that operation would be impracticable during at least three months of the year; but ingenuity and dogged persistence won out against the obstacles interposed by our winter conditions. To-day electric railway investments are regarded with special approbation, and those who backed their faith in the early nineties do not look back with regret upon the venture.

Victory was not gained, however, without a desperate and sustained struggle. When a blizzard from the West was blowing it was found that the relatively small sweepers at first available were not always able to keep the tracks clear, and if a tie-up for half an hour took place the battle was lost. The larger sweepers now in use, with much greater motive power beneath them, have quite satisfactorily overcome that trouble. In nearly all cases electric lines are obliged to keep the snow on the streets down to a certain depth, and wing plows are generally used for this purpose. The wing plow follows so closely after the sweeper that the snow is never permitted to accumulate to a depth of more than 2 in. or 3 in. After each storm the snow piled up along the extreme margin of the roadway is removed by sleighs to convenient dumping points. The company supplies large boxes for the purpose and, at a specified contract figure, sleighs are provided by private owners. Last year the cost of removing snow amounted to $238,882.

The public service of electric railways in 1910 was represented in the carrying of 360,964,876 passengers, over and above transfers, and 852,294 tons of freight. This was a better passenger business by 46,938,205 than for 1909, and 246,030,220 above the figures of 10 years ago. A growth of over 200 per cent in the volume of traffic within the decade must be accepted as highly encouraging. The contribution of the larger centers to the total was, of course, large. Montreal had 102,377,923 passengers; Toronto, 103,480,724; Winnipeg, 28,841,161; Ottawa, 15,987,849, and the cities at the Pacific Coast, 33,417,659, apart from transfers. The conduct of the entire service of the Dominion involved 65,249,166 car miles, of which 889,561 were identified with the movement of freight and mails.

The freight business has not reached relatively large proportions, but it is growing steadily. Like the passenger traffic to which allusion has just been made, it has increased by 200 per cent within 10 years. The outlook, however, points to expansion. In the Niagara orchard district the electric lines carry small fruits to the markets much more expeditiously and conveniently than can the steam roads. In fact, this method of handling orchard and garden products has very decided advantages, and the business is developing rapidly. In the western sections of Ontario rural lines are also doing well, and their success has led to the projecting of quite a number of roads in other parts of the Province. In fact, apart from the fast filling up West, the extension of electric railway interests in Canada will probably take place to a considerable extent along the line of these freight roads. They will not be devoted exclusively to the carrying of products of various sorts, but to passengers as well.

Right here it may not be amiss to refer to an aspect of this freight business which has recently arisen. The Railway Commission of Canada has large and comprehensive powers with respect to the regulation of rates, and the question of jurisdiction over lines holding charters from the Provincial Legislatures has become a matter of legal controversy. At the present time a suit is pending before the Imperial Privy Council to which the Railway Commission and the Montreal Street Railway are parties. The issue will affect electric roads directly, but will also have an important bearing on steam lines.

This whole subject of electric railways in Canada cannot, unhappily, be dismissed without a reference to accidents. During the year 95 persons were killed and 2538 injured. Of the killed, 14 were passengers and 13 employees; of the injured, 1595 were passengers and 227 employees. This toll of life and limb is reflected in the operating expenses to the extent of $340,000 for damages. The steam roads killed one passenger in every 598,243 during 1910, while the electric lines had one killed in every 25,783,205. This showing is favorable to the latter; but the fact remains that loss of life and injury to passengers and others exhibits an ascending tendency.

STATISTICS OF THE GENERAL ELECTRICAL INDUSTRY

In this week's issue of the *Electrical World* the statement is made that 1910 was not a bad year for the general electrical industry. In fact, all industries enjoyed a steady advance much more sound and healthy than marked the notable expansion up to four or five years ago. In support of this statement it presents the table published on the next page as an estimate of the approximate sums for the items given.

In connection with this table it says: "The gain in electrical manufacture has been taken at about 10 per cent; in electric railways at 10 per cent, which may be slightly low; in central station work at 20 per cent, which is about right; in telephony, nearly 20 per cent; in telegraphy, about 7 per cent; in isolated plant service, nearly 30 per cent, which may be excessive, but

	1909	1910
Electrical apparatus made	$275,000,000	$300,000,000
Electric railway earnings	475,000,000	520,000,000
Central-station sale of energy, etc.	250,000,000	300,000,000
Telephone earnings	250,000,000	275,000,000
Telegraph earnings	60,000,000	65,000,000
Isolated light and power plant earnings	75,000,000	100,000,000
Miscellaneous electric service	50,000,000	75,000,000
	$1,435,000,000	$1,635,000,000

includes a lot of big power work, mines, battleships, etc.; in miscellaneous service, 50 per cent, which also may be high, but is likely to be correct. In other words, the largest single item of gain is taken at a low rate, and this method of computation would offset any excess in the smaller gains assumed at a higher rate."

COMMUNICATION

PITTSBURGH CAR SERVICE

CHICAGO, Dec. 29, 1910.

TO THE EDITORS:

I have delayed answering the letter in your issue of Sept. 24 from Judge J. H. Reed, vice-president of the Pittsburgh Railways Company, while making an effort to secure more information about the relative car service in Pittsburgh, in regard to which there has been some correspondence in your columns.

The main point at issue is whether or not, as originally stated and as questioned in Judge Reed's first letter, "according to this record the *standard* of service furnished decreased from 1902 to 1908, with a considerable improvement in 1909."

This statement was made in my report in connection with a table showing the total passengers per revenue car mile for each month from January, 1902, to March, 1910. This record was shown graphically in the diagram therewith, together with the corresponding records of "gross earnings per revenue car mile" and the "operating expenses per revenue car mile," so that as far as the records, using the car-mile unit, can indicate, this diagram tells the story *by months* of the operation of the Pittsburgh Railways Company since the formation of the companies into one combined system a little over eight years ago, and proves the statement to be correct when the service is compared on a "car-mile basis."

There seems to be no question that the standard of service in 1909 was considerably improved over that of 1908, which confirms the latter part of the original statement.

Whether or not the standard of service in 1908 was higher or lower than in 1902 can be more accurately determined only by a study of the "seat-mile record," and in order to avoid any further approximations I have made an unsuccessful effort, as shown by the following letters, to secure the exact information:

"Chicago, Oct. 10, 1910.

"Judge J. H. Reed,
"Vice-president Pittsburgh Railways Company,
"Pittsburgh, Pa.

"My dear sir:

"I have read your interesting letter, published in the Sept. 24 issue of the ELECTRIC RAILWAY JOURNAL, replying to my letter published in the Sept. 17 issue of the same journal, and it seems to me that, notwithstanding the interest that this controversy might have to some, there is no necessity of its continuing, for my only object is to know the exact facts and draw correct deductions from them, and if I find that I have based my original statement upon wrong information and drawn wrong deductions, I shall be very glad to correct it. Your letter seems to indicate that you have correct records of the exact number of seat miles operated by your company during the period of years under discussion, and if you have and will place this information at my disposal, so that I can check it up, I shall be very glad to do so, and, after I have done so, write a reply to the JOURNAL which will rectify any error, if one has been made, and also correct my report accordingly before its final publication.

"I have ready what appears to me to be a very satisfactory reply to your last communication to the JOURNAL, which I shall hold until I have had time to hear from you, as it seems to me that the plan I have outlined above would be better if we can carry it out.

"I shall be in Pittsburgh on Saturday, the 15th inst., and if you should think well of my suggestions I will appreciate it if you will place the information so that it will be available to Messrs. Damon and Bibbins, of my Pittsburgh office, between now and that time, so that it could be got in shape for me to look it over on the 15th inst. when there.

"Yours very truly,
(signed) "Bion J. Arnold."

"PITTSBURGH RAILWAYS COMPANY.
"Pittsburgh, Pa., Oct. 31, 1910.

"Mr. Bion J. Arnold,
"181 La Salle Street, Chicago.

"My dear Mr. Arnold:

"Your letter of Oct. 10, addressed to Judge Reed, has been referred to me.

"I owe you an apology for not having replied at an earlier date, but many things have occurred since my personal interview with you which have caused me to think it would be unwise at this time to have any more checking of our records, although I can assure you that the statements contained in Judge Reed's letters are correct and can be proven at any time the necessity may arise.

"Very truly yours,
(signed) "James D. Callery, President."

As the matter stands at present the records originally furnished me by the company *do* indicate that the standard of service decreased from 1902 to 1908, but it now appears that the railway company has other records, which it feels that it cannot furnish at this time, which apparently show considerable improvement in the standard of service in 1908 over that of 1902. By the company's statement, as given in Judge Reed's letter of Sept. 19, that it had cars stored in 1908 which were not operated, it seems to admit that the service in 1908 was not as good as the company could have made it, and that the service was improved in 1909. The question, therefore, as to whether the crowding, and, therefore, the service, was better or worse in 1908 than in 1902 can only be determined by a comparison of the "seat-mile records," which I regret are not available to me.

In conclusion, I might say that this statement in regard to the service is only one of possibly several statements made in the report which, in order to maintain a consistent position, the company may find it necessary to question. But I have endeavored in my analysis of the Pittsburgh transportation situation to maintain an impartial attitude, and I believe that an examination of my entire report, which is now in press, will show such an attitude. In order to maintain this attitude, in view of the present conditions, I am sending you this letter in place of the reply which I had previously prepared, and which is referred to in the second paragraph of my letter to Judge Reed of Oct. 10, 1910.

BION J. ARNOLD.

NOTE: The report on car service in Pittsburgh to which this letter refers was submitted by Mr. Arnold to Mayor Magee on July 28, 1910, and was printed in abstract in the ELECTRIC RAILWAY JOURNAL for Aug. 13, page 265. The other letters to which Mr. Arnold refers were printed in this paper as follows: Aug. 20, page 304; Sept. 17, page 441; Sept. 24, page 475.

[EDS.]

OPERATING AND MAINTENANCE RULES ADOPTED BY THE AUSTRIAN STREET RAILWAY ASSOCIATION

The Austrian Street Railway Association has recently published a set of standard rules for operation and maintenance. This code which went into effect Jan. 1, 1911, has been formally approved by the Austrian government. It has been issued to the members as a pamphlet which is sold for about 21 cents a copy. There are four sections, as follows: General rules, track, line and rolling stock.

The section on track recommends that the track construction should be examined at least twice a week on unpaved sections where the operating speed does not exceed 20 km an hour (12.8 m.p.h.) and on paved sections where the operating speed does not exceed 30 km an hour (18.6 m.p.h.). Daily inspection is recommended for higher speed lines. Switches should be examined every day on all lines, irrespective of operating speeds. An inspection means the tightening of joints, the readjustment of bonds, the operation of switches and signal towers, the inspection of drainage, the cleaning of grooves and the lubrication of curves. The annual track examination should include the measurement of gage, rail wear and curve elevation. Rails in cross-tie construction should not remain in service if the dead weight on them exceeds 1200 kg per square cubic centimeter (16,500 lb. per square inch). The grooves of rails must not exceed 65 mm (2½ in.) in width on curves except where steam cars are also run. In the latter case the groove must not exceed the original width by more than 25 mm (0.88 in.). The wear of the railhead must not exceed 30 per cent of its original width. The test widths of the groove and of the railhead must be taken along a line 10 mm (0.39 in.) below the tread.

The line section states that the insulation of underground feeders should be measured four times a year and that underground cable boxes should be examined twice a year. The insulation of the overhead trolley wire connections and its supports is to be measured four times a year when located near telegraph, telephone and other weak current circuits; otherwise twice a year will be sufficient. The insulation against trolley and ground of all span and other supporting wires must be at least 1 megohm. The trolley wire should be examined twice a year to observe its wear, position with regard to the center of the track, suspension and the condition of the ears. This inspection should also include the insulation, section breakers, overhead circuits, switches, auxiliary wires, circuit-breaker boxes, telephone wires, span wires, lightning protection, etc. Inspection should be made every two years of the connections between span wires and wall rosettes, strain insulators, etc. The permissible wear of trolley wire on tangents should not exceed 65 per cent of the original cross-section. Spans and suspension wires must be removed when one-fourth of the cross-section has been lost through rust or other causes.

Iron poles should be examined for oxidation every three years and for painting. Wooden poles should be tested annually during the dry season. These examinations are to be made by sounding and in doubtful cases by boring the pole directly above the ground line. The sawdust, of course, will show the condition of the wood. All boring holes must be plugged up with a piece of hard wood. The wooden poles should be exposed for a depth of 20 cm (7.8 in.) every two years to permit the inspection of the wood fibers with some sharp instrument. The latter examination should be made annually on poles which have been used for over 10 years.

The rolling stock section recommends that motor cars should be examined daily. The general overhauling should be made every 50,000 km (31,000 miles) or at least once a year. Trailers should be overhauled at least every 60,000 km (37,000 miles) or 1½ years. Limits of wear also are specified for different portions of the car equipment. Brake shoes without special heads must not be used if less than 10 mm (0.39 in.) thick. The tires of driving wheels used for wheel loads up to 3 metric tons should be at least 16 mm (0.6 in.) thick and for wheel loads up to 4.5 tons, at least 18 mm (0.7 in.) thick. Trailer wheels and tires for the same load may be 2 mm (0.078 in.) thinner. If the tires are keyed to the wheels the corresponding limits of tire wear are 20 per cent less than those hereinbefore given. The wheel flanges may be worn to 8 mm (0.31 in.) thickness and 12 mm (0.47 in.) height. The same wheel flange rule applies to curved T-rails if the latter have guards on the inner side at least. If this is not the case the minimum flange height should be 15 mm (0.59 in.) and the minimum flange thickness 12 mm (0.47 in.).

NOTES ON THE NORTHERN ELECTRIC STREET RAILWAY, SCRANTON, PA.

On July 1, 1910, the Northern Electric Street Railway Company, Scranton, Pa., was leased to the Scranton-Binghamton Railroad Company for 990 years. According to the agreement, the stockholders of the leased company will receive 3 per cent on their stock during the first year (1911) of the lease and ½ per cent more for each year following until a permanent dividend rate of 6 per cent is attained.

Since publication of the description of this company's property in the Electric Railway Journal of March 21, 1908, the railway has built an extension of 6 miles to a large private park on Lake Winola, giving a total trackage of 20 miles. The gross earnings of this company for the year ended June 30, 1910, were practically $169,000 on 20 miles of track. It is expected that the gross earnings for the next fiscal year will show an increase of 10 per cent to 15 per cent owing to the completion of the Lake Winola extension and the general growth of the business. The detailed figures for the fiscal year ended June 30, 1910, are as follows:

Passenger earnings	$155,010.71
Freight earnings	8,090.89
Other earnings, including car advertising	6,028.37
Total gross earnings	$169,129.97
Operating expenses	106,737.37
Income less operating expenses	$62,392.60
Net income after deduction of fixed charges, taxes, etc.	416.21

The net earnings for July and August, 1910, were $24,835.52, which is $2,247.48 more, or 10 per cent greater, than for the corresponding months of 1909.

The figure of $8,090.89 given as the freight earnings covers the work of a single milk car. This car makes two trips, or 80 miles, a day on weekdays and one trip, or 40 miles, on Sundays. The weekday business amounts to 80 40-quart cans. While profitable, this business is no larger because most of the producers have a rather short haul to market. The business emanating from the vicinity of Lake Winola, which is 20 miles from Scranton, is handled for 18 cents a 40-quart can.

Since the opening of the line in 1907 four more sidings have been installed on the 20-mile section between Scranton and Lake Winola. This makes 17 sidings in all, thereby permitting a 15-minute instead of a 30-minute schedule. During the summer a 15-minute service is given over the entire line, and the same schedule is maintained half way out of Scranton for eight months in the year. About $46,000 was spent in the last fiscal year for various track improvements, such as the reballasting of the track, straightening out of curves and the construction of 6600 ft. of track around Lake Winola. All of the sidings have Pennsylvania split switches. The special work within the limits of Scranton is of solid manganese.

The company has recently installed in the Dalton power station a 100-k.v.a. motor generator set, which converts current from the 370-volt station busbars to supply light for Factoryville, La Plume, Dalton, Waverly, Glenburn and Clark's Summit. This plant will also be enlarged later to take two 750-kw turbines for the projected Scranton-Binghamton Railroad.

The company now has 14 passenger cars and four service cars. Rolling stock in service is inspected every night and overhauled on a basis approximating 50,000 miles. Wheel sets are sent to Scranton and turned for $7 per set exclusive of the transportation charges, which are paid by the railway. All of the wheels are of solid steel of Latrobe, Schoen or Standard design. As a rule 60,000 miles is secured before a turning. Some of these wheels have already run for over 200,000 miles. It is proposed to install wheel-handling machinery when rolling stock is purchased for the allied Scranton-Binghamton Railroad. Since beginning operation in 1907 the company has not had a single breakage of the motor frames or malleable iron gear cases originally installed. All armature and field winding is done by an outside electrical contractor. The motors, which are of the Westinghouse 101-D type, have given excellent satisfaction and have required no change except in the field coil terminals. The original terminals proved too light for the service because the plain solder connection did not give enough contact area. The terminals are now re-soldered and riveted to the ribbon winding by two copper rivets which are passed through the terminal slot.

The cars of the company are painted Tuscan red. They are washed twice a week with cold water and at intervals of four to six weeks with the No. 000 emulsion of the Imperial Car Cleaner Company. After the dried cleaner has been rubbed off, Devoe's furniture polish is applied to secure a high finish. The cost of this work is as follows: Imperial cleaner at $1.05 per car; ½ quart furniture polish at 75 cents per quart; 14 hours of labor at 15 cents per hour, a total cost of $3.52½.

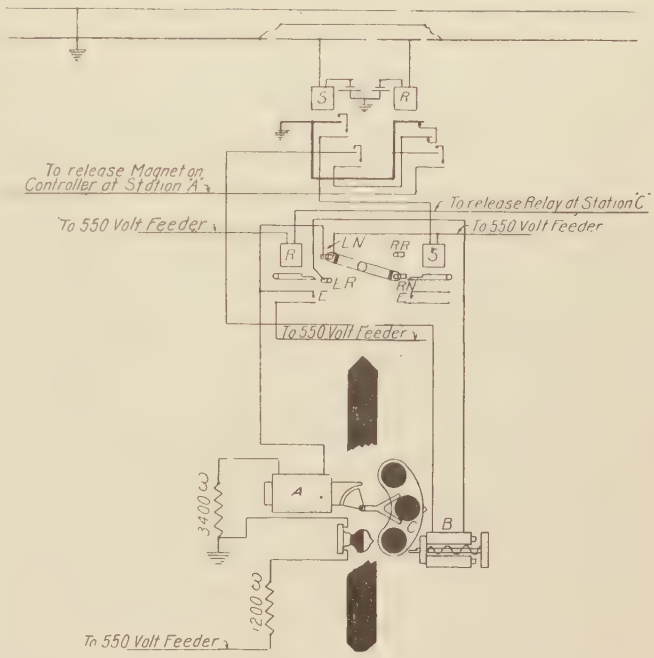
BLOCK SIGNAL SYSTEM ON BALTIMORE VIADUCT

An interesting installation of signals has just been completed by the Kinsman Block System Company, New York, on the Guilford Avenue line of the United Railways & Electric Company's system in Baltimore, Md. These signals are located on a double-tracked elevated structure known as the North Street Viaduct. They are used to protect the spans and stations at Madison Street and Center Street, and also to give protection on account of steam and smoke which are caused by steam locomotives which run underneath this portion of the structure. The length of track protected is about 1500 ft. There are six signals, three on the southbound track, "A," "B" and "C," and three on the northbound track, "D," "E" and "F." The average length of each block is about 500 ft.

The signals are operated by track circuits. As a car approaches a signal and before it enters the block it passes over a section of track known as the setting section, which is from 60 ft. to 90 ft. long. As it leaves the block it passes over a section known as the release section, which is 30 ft. long. It will be seen from the track plan that a car passes over the setting section to signal "A" as it approaches that signal and it passes over the release section to signal "A" after it has passed signal "B."

A marker has been installed at the left of the track and at the beginning of the setting section. This marker is a green board with a green light for night indication. It marks what is known as the "Section Point." When a car approaches the signal and before it passes the section point the signal indicates either "Clear" or "Stop." When the signal indicates "Clear" the semaphore is in the vertical position and a white light is shown as a night indication. When it indicates "Stop" the semaphore is horizontal and a red light is shown.

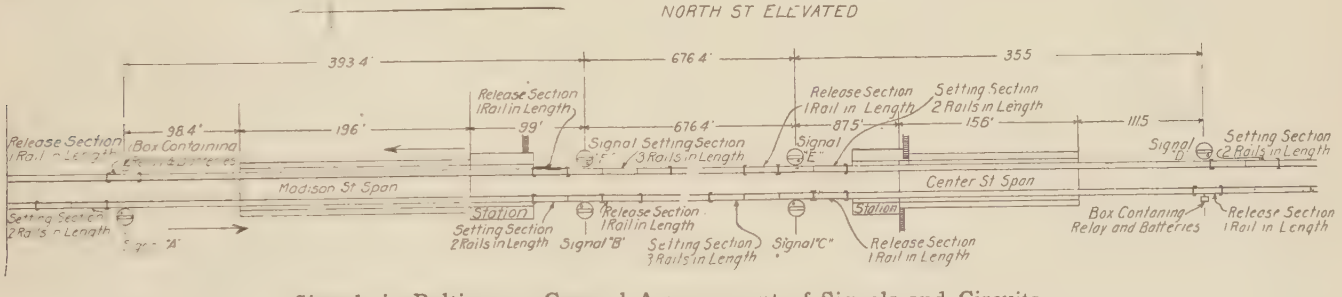
If the signal indicates "Clear," or that the block is unoccupied, the car passes onto the setting section and the signal



Signals in Baltimore—Arrangement of Circuits and Apparatus at Signal "B"

operates from the vertical position to the oblique or 45 deg. position. In this case, the light changes from white to green. This movement of the semaphore or its change of position is an indication to proceed through the block at usual speed.

If the signal is in the "Stop" position the motorman of an approaching car is instructed to stop at the section point and wait until the signal changes to "Clear." Then he may proceed with caution until he gets his indication to proceed at



Signals in Baltimore—General Arrangement of Signals and Circuits

his customary speed as described hereinbefore. Should the motorman run past the section point before bringing his car to a stop, he is instructed not to back up but to wait on the setting section. The signal will remain at "Stop" until the car which is in the block passes out into the block ahead; as it passes over the release section the signal in the rear will operate to the "Clear" position, and will then fall to the 45 deg. position. The latter change of position of the semaphore is the "proceed" indication to the motorman who has his car on the setting section. The rule that the motorman stop his car at the section point should be obeyed so as to give him ample time to observe the operation of the signal. However, a failure to observe this rule does not prevent the signal from giving its proper indication.

After a car passes over the setting section, and as it passes

the signal and enters the block, the semaphore moves to the horizontal position and shows a red light by night, indicating "Stop." The signal remains in this position as long as the block remains occupied.

If the apparatus should become deranged either of three things would happen: First, the semaphore would immediately operate by gravity to the "Stop" position and remain there until repairs are made; second, the signal would operate normally to allow the first car to enter the block and would assume the "Stop" position and remain in this position; third, the signal would not operate as the car passes the section point to give the indication to proceed. This failure of the signal to operate is a danger indication. The burning out of the lamp in the signal is also considered as a danger indication.

If a signal is out of order or shows a "Stop" indication continuously the motorman is instructed to hold the car at the section point or on the setting section long enough to assure him that if there is a car ahead it has had time to pass entirely through the block. Then the motorman may proceed with extreme caution according to the regular operating rules governing traffic on trestles and bridges. As the traffic is always in one direction on each track it is not necessary to give protection for reverse movements. The signal operates for each car when run independently, or it will operate once for each train if a number of cars are coupled.

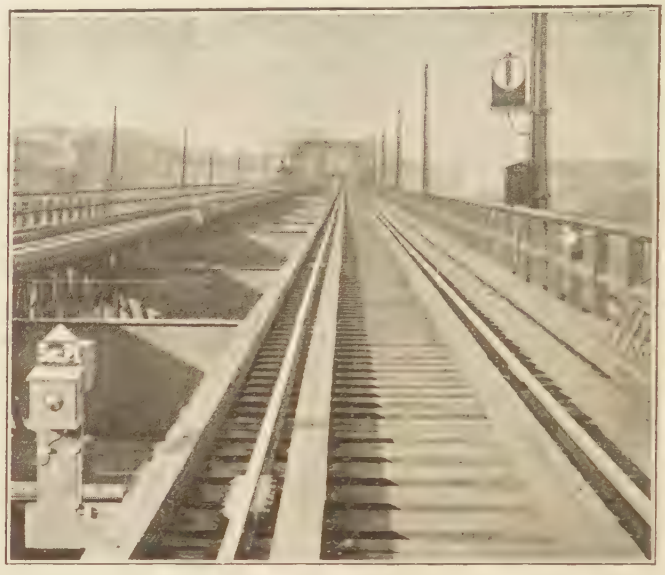
In this system only one line wire is required. The circuit drawing shows grounded circuits, but the circuits are metallic and are only grounded because the wires are connected to the grounded rails. The signals, the controller and other apparatus used are the same as employed in the single-track system which this company has installed. All wires are carried to the tops of the poles and to the track in loricated conduit.

It is necessary to insulate only one of the traffic rails, and as the insulated sections are short jumper cables are used, the ends being bonded to the uninsulated rails near the joints.

The relays are operated by current from caustic soda batteries. The Edison cell with a low temperature electrolyte is used so that it is not necessary to install the batteries in wells or chutes placed underground.

In the diagram relating to signal "B," the point marked "A" is the operating magnet; "B" the magnet which slots the signal at 45-deg. position; "C" the spectacle which carries colored glasses; "E" the contacts which are closed when the release magnets are energized.

Signals in Baltimore—Proceed Indication



Signals in Baltimore—Clear Indication

Signals in Baltimore—Stop Indication and Section Point

LONDON LETTER

(From Our Regular Correspondent)

The work of extending the use of electricity on the Lancashire & Yorkshire Railway system converging on Liverpool has been commenced on the line from Maghull to Town Green. When completed this line will form a portion of the original electric "belt" system from Liverpool to Southport via Ormskirk.

The Metropolitan Electric Tramways, Ltd., operating in the north of London, was recently summoned by the Tottenham District Council for the recovery of £371, the balance of the general district rate for the half year. The company contended that the tramway came within Section 211 of the Public Health Act, 1875, and should therefore be assessed in the proportion only of one-fourth of the annual value. The tramway is, in fact, linked with a light railway, and the company claimed that on this account it was also exempt from the full rate. The court decided that the tramway was not a railway within the meaning of Section 211 and ordered the payment of the full rate with costs.

Robert Hammond, as arbitrator, has determined the price which the Paisley District Tramways Company is to pay the Paisley Corporation for electricity for operating the tramways. Under the Paisley District Tramways order of 1901 the rates were fixed for seven years and subsequently fixed for two years additional as follows: 2d. per unit for the first 200,000 units per annum, 1¾d. per unit for the next 100,000 units per annum, 1½d. per unit for the next 100,000 units per annum and 1¼d. per unit for all additional energy. Mr. Hammond has decided that the rate to be paid by the company to the corporation for seven years shall be a fixed sum of £4 15s. per kilowatt per annum of the maximum power delivered to the tramway feeders and in addition the sum of 0.475d. per unit for all units delivered to the tramway feeders and metered at the generating station. The maximum power delivered to the tramway feeders during the year is to be taken as the average power delivered to the tramway feeders during the period of 30 consecutive minutes in which the electrical energy supplied to the company is a maximum for the year. Pending the determination of the amount of the maximum power and of the cost of coal each year monthly payments of £275 are to be made by the company and 0.475d. per unit for all units supplied, the necessary adjustments of the accounts to be made at the end of each year. As the company has been taking about 1,300,000 units from the corporation and the maximum load for the tramways has been about 575 kw, the capital charge to be made by the corporation is 0.504d. per unit and the total charge 0.979d. per unit. The corporation claimed that the average price of 1.4d. per unit which the company has been paying should be continued and the company asked for a reduction to 0.56d. per unit, so that the award is almost the mean of the two prices.

The highways committee of the London County Council reported at a recent meeting that it had considered the tenders submitted recently for 5000 tons of track rails and about 700 tons of conductor rails. It has been decided to award the contract for the conductor rails to the Frodingham Iron & Steel Company, the lowest bidder. The lowest tender for the track rails was received from a London firm which proposed to supply rails manufactured by the Belgian Steel Rail Syndicate, but as this tender was only about £800 lower than the tender of Walter Scott, Ltd., Leeds, which amounted to £32,855, it was decided to order the rails from that firm. The committee pointed out that the difficulties of inspection during manufacture were greatly increased when the rails were made abroad, and that the same control could not be exercised over the work as when the product was turned out at home.

The libel action against Sir John Benn by Griffiths & Bedell for remarks which he had made against the G. B. surface contact system, constructed for the London County Council in the Mile End Road, which was referred to in the ELECTRIC RAILWAY JOURNAL of Dec. 3, 1910, page 1121, continued for 12 days, and resulted in the jury awarding the plaintiffs £12,000 damages, to be equally divided between them. The defence contended that Sir John Benn had made the disparaging remarks in political speeches, and that they referred to the system as laid down in London and not to the system as a whole. Evidence was produced to show that the system had been greatly modified as applied to London, and Mr. Bedell, the inventor, claimed that if the system had been installed as he desired it would have been satisfactory. The decision rested upon whether the remarks made by Sir John Benn were libelous and made with malice. Sir John described the G. B. system as constructed in the Mile End Road as a "mischievous and impossible system," a "jerry-built system" and a system that "had been condemned by all experts as unsuitable for London." He also referred to the system as a "fiasco." During the action he maintained that the system was inefficient, unsafe and unsatisfactory. The judge decided that the comment which had been made could not be said to apply only to the system as laid down in the Mile End Road. The case was interesting, but it is hardly necessary to go into the details. Briefly, the system was constructed by other contractors with modifications insisted upon by the London County Council. When it was put in operation it was found to be unsatisfactory on account of so much trouble with live studs. William Mordey, an independent expert, after a careful investigation of the system under the very worst circumstances, reported that the system could be made to work satisfactorily with certain changes. Afterward the London County Council decided to replace the system by the overhead trolley. Since the decision the impression has grown that Justice Ridley, before whom the case was tried, did not sum up the case impartially and an appeal has been taken.

The British Electric Traction Company tried recently to solve the problem of fares by adopting farthing fares. Now Mr. Dalrymple, the general manager of the Glasgow Municipal Tramways, has reported on the question. As is well known, Glasgow has been very liberal in the matter of fares. One can travel between two and three miles for a penny, and there are stages a little more than half a mile for which one can travel for a halfpenny. Notwithstanding this, efforts have been made for some time to increase the length of this halfpenny stage. It has practically been decided by the committee not to change the penny stages, which are about 2½ miles, but to institute a three-farthing stage, the distance of the three-farthing stage to be equivalent to two halfpenny stages. To avoid the difficulty which the British Electric Traction Company had in regard to the farthing, a coin which is not in general use, the Council of Glasgow has decided to issue books containing 12 tickets for 9d. The two-stage coupon books are to be tried for a period of four months. It is feared that the new system will interfere with the penny traffic. At first it was contended that the three-farthing fare would benefit the workingman, but as it has been decided to sell books of a dozen coupons it is thought that well-to-do people will benefit most. Should it be found that this new departure interferes with the traffic receipts, it will be discontinued at the end of four months. Mr. Dalrymple is opposed to the conductors themselves handling the coupon books, so passengers will have to purchase them in the offices of the company. The conductors will be supplied with three-farthing tickets and they will exchange them for the coupons.

The Stepney Borough Council and the London County Council are unable to agree with regard to the proposed reconstruction of the horse trams along Burdett and Grove Roads, forming a junction with Commercial Road and Mile End Road. The London County Council has proposed that the overhead trolley system be installed, especially as the line is not expected to be remunerative at first. The Stepney Council insists upon the conduit system being adopted.

In order to encourage efficiency at Bradford, C. J. Spencer, general manager of the Bradford Corporation Tramways, who had to report recently on the application of the employees for increased remuneration, has suggested that increases in pay should not be granted automatically by right of seniority. Mr. Spencer evidently believes that many of his employees could increase their efficiency appreciably, and that only those who become known for their general efficiency should be rewarded with an increase in pay.

A. C. S.

News of Electric Railways

Cleveland Traction Situation

N. W. Harris & Company, New York, N. Y., in their proposal to finance the Cleveland Railway, which was presented to the board of directors of the company on Dec. 31, 1910, suggests three changes in the conditions of the grant, the most important of which is to the effect that an annual reserve fund be established to amortize the franchise valuation of $3,615,843.89, which was fixed by the late Judge R. W. Tayler. The establishment of such a reserve fund would add another division to the distribution of the income, and it is believed that the present fare of 3 cents plus a cent for a transfer would not cover the additional charge. The suggestions made by N. W. Harris & Company are contained in the following portion of the proposition placed before the directors:

"As a result of our recent investigation of the street railway situation in Cleveland, we are prepared to enter into a contract to purchase an issue of bonds sufficient to meet your present financial obligations.

"Our examination of the franchise under which you are at present operating, however, leads us to make certain suggestions to you which we believe to be of vital importance, looking particularly to the increase of facilities and the development and extension of the property.

"We have been familiar with the street railway conditions in Cleveland since about 1893, when we made our first purchase of the bonds of your company. We have observed the rapid growth of the city and the consequent necessity for increased service and extension of facilities. There is every reason to assume that this growth will continue and it will inevitably mean greater service and increased facilities to be provided by the continued contribution of new capital.

"It is of vital importance that you should be in a position to raise new money by the sale of stock as well as by the sale of bonds, that you may have these combined resources to avail yourselves of as other companies do, and in order that a proper ratio between bonds and stocks should be preserved.

"The financial stability of a company and the resources which it has on hand to raise money in the future are points carefully considered by the discriminating investor. Your bonds would be more secure and we could therefore make the terms of purchase more attractive to you if the Tayler ordinance were amended in the following particulars:

"First—You are given the right to sell 6 per cent bonds, but in our judgment, from the standpoint of credit, the bond issue should not bear more than 5 per cent interest. You should therefore be given the right to sell 5 per cent bonds at not lower than a 6 per cent basis, to meet varying market conditions with the right to amortize any discounts which may, from time to time, be made to dispose of the bonds. At the present time some discount would have to be allowed to sell a 5 per cent bond.

"Second—To make possible any future sales of stock, the intrinsic value of the same must be protected and the franchise should be so amended as to make it clear that all future extensions and actual additions to the present property shall be maintained at 100 per cent of their reproductive value through a reserve fund set apart annually.

"Third—For the same reason an annual reserve fund should be provided to amortize the principal of the franchise value of $3,615,843.89 established by the Tayler ordinance.

"With these three items corrected, we would feel that you were in a position to take care of the future expansion of the street railway business by the sale of both stock and bonds, instead of being absolutely limited to bonds, as seems to be your present situation.

"It has been suggested by Winthrop Coffin in his report that the growth of the city before the expiration of the franchise may require such extensions, betterments and increased service that the present maximum rate of fare will be too low; but we judge that should this at any time be found to be the case, the city would grant such reasonable modifications as would continue to insure a 6 per cent return on your stock, without which it could not be sold at par; which in turn would prevent the company from meeting the requirements of a growing city."

Messrs. Harris & Company did not state that they would refuse to purchase the bonds unless their suggestions were adopted. They said that if other bond houses were invited to consider the matter they might be willing to take the bonds under present conditions. The proposal was presented to the directors by Horace E. Andrews, former president of the company, and a discussion covering three hours followed. Nothing was given to the public at that time regarding the view of the directors.

J. J. Stanley, president of the Cleveland Railway, has since transmitted a communication to Mayor Baehr in which he asks that the changes in the Tayler grant suggested by N. W. Harris & Company be made. Street Railway Commissioner Dahl is opposed to any change in the franchise except such as will provide against loss in marketing bonds below par. Mr. Dahl says the provisions named were asked for the purpose of placing the stock in a better position and not for the benefit of bondholders. The bond house, however, stated that the stock should be of such value that the company would not be compelled to depend solely upon the disposal of bonds to take care of its needs. The letter by Mr. Stanley follows in part:

"The Cleveland Railway has realized for some time the inadequacy of the service rendered by it to the public, and has hoped to dispose of stocks or bonds sufficient in amount to enable it to make needed extensions and additions. It has found, however, that investors decline to purchase its stock, mainly for the reason that, while for a series of years 6 per cent income may be relied upon, they feel that the return of the principal at the expiration of the franchise is not so well assured. As bearing upon this question, we inclose a letter received Dec. 31, 1910, from N. W. Harris & Company.

"We desire to call your attention to the situation as it exists. The company has accepted a valuation of its property and has agreed to be satisfied with 6 per cent upon its stock. The elements of speculation having been taken out of the stock and the rate of profit definitely limited, it is all the more necessary, in order to invite new capital, to make the payment of the limited rate of interest, together with the return of the entire amount of the principal, perfectly secure. The company must, however, rely upon the sale of its stock and bonds for additional financing, and now finds that under the Tayler ordinance careful investors do not feel that any new principal they may invest in the stock of the company is protected.

"While it was the idea and purpose, frequently expressed, that the stockholders of the company should be assured not only of 6 per cent interest upon their stock, but of the return of the principal of their stock if the city should exercise its option to purchase the property, and while the ordinance itself declares that the purpose of the settlement is the making of a contract between the company and the city which, in the words of the ordinance, 'will secure to the Cleveland Railway unimpaired the capital value' fixed by Judge Tayler, yet prospective investors in the company's securities are of the opinion that the ordinance imperfectly provides for the accomplishment of this purpose, and they ask that it be so modified as to protect the principal of both present and future investment.

"It is to the mutual interest of the city and the company that additional capital to provide for reasonable service and proper extensions be obtained. The company wishes to join with the city in any method that may be found feasible for the fullest investigation of all conditions and for working out the fewest changes possible in the Tayler ordinance necessary to attract and protect investment.

"We are ready to meet you or any representatives that may be appointed by you for that purpose, feeling confident that if investors can be assured of the security of their investment, we shall be able at once to obtain money for the

purchase of 200 new cars, the building of necessary extensions and the improvement of the service."

The annual meeting of the stockholders of the company will take place on Jan. 25, 1911, and it is said that the question of issuing $3,500,000 of bonds, bearing 5 per cent interest, will be submitted to them for consideration at that time. This will open the way to compliance with the demands of the city and the directors will ask that the terms and conditions upon which the securities are issued be left to them, so that further action will be unnecessary should an agreement that is considered fair be reached. Should the city agree to the establishment of a reserve fund to take care of the franchise value, it will require something like $12,000 per month for the franchise term to aggregate the amount necessary.

Mayor Baehr, Street Railway Commissioner Dahl and the special committee of the City Council named some time ago made a report to that body on the evening of Dec. 27. The report states that it will never be possible to operate the system efficiently without a subway terminal under the public square and reaching out a reasonable distance in the downtown section. A high-level bridge across the Cuyahoga River to reach the West Side, the elimination of grade crossings over steam roads and the addition of 200 cars to present equipment are other needs that were mentioned. The construction of the bridge has been provided for and many grade crossings will be eliminated within the next year or two, but the other requirements are yet uncertain. The committee states that the service during the rush hours in the evening is inadequate. The report, in part, follows:

"There are certain physical obstacles in the way of rapid and efficient service during the rush hour period in the evening which have always obtained in Cleveland, and which will be removed in the immediate future. The most serious obstacle to service on the West Side is Superior viaduct. On the East Side the various grade crossings have the same effect, though, of course, in a smaller degree.

"At the present time, during the evening rush hour, there is a car operated east on Euclid Avenue, between the square and East Ninth Street, every 20 seconds; south on Ontario Street from the square every 18 seconds, and west across the Superior viaduct every 18 seconds. It is difficult to operate under a much closer headway, and no matter how many cars are in operation, it will never be possible to operate efficiently without a subway terminal under the square and reaching out to a reasonable distance in the downtown section in order to avoid congestion.

"But before the grade crossings are eliminated, the high-level bridge constructed, and surely before a subway terminal at the square can be constructed, it will be necessary to better the service during the evening rush hour, and it is apparent that the Cleveland Railway should acquire additional equipment at the earliest possible time. At least 200 more cars should be purchased.

"To procure money for these cars and in view of further financing, which it will soon be necessary to undertake, a comprehensive scheme of refinancing and refunding the present debt of the Cleveland Railway is necessary, and the practicability of this financing is now in process of investigation and, we hope, successful solution by the railway company and the street railroad commissioner. In its last analysis, then, the problem of immediate efficient service is the problem of financing."

Toledo Traction Situation

Dr. J. F. Demers, a member of the board of directors and the executive committee of the Toledo Railways & Light Company, Toledo, Ohio, died at his home in Levis, a suburb of Quebec, Can., on Dec. 26, 1910.

The resignation of William B. Hale, Chicago, as a member of the board of directors and chairman of the executive committee was received on Dec. 29. Mr. Hale stated that he desires to devote his entire time to private business in Chicago. The remaining members of the executive committee are Albion E. Lang and Jay K. Secor, Toledo, and William E. Hutton, Cincinnati. The board of directors consists of six Toledo men and Mr. Hutton. The vacancies will not be filled until the annual meeting on Jan. 19, 1911.

At a meeting of the council committee of the whole on the evening of Dec. 28, 1910, the following form of reply to the letter of A. E. Lang, president of the company, was agreed upon:

"In response to your letter of Dec. 24, 1910, in which you proposed that as a basis for the discussions suggested in my letter of Dec. 15, 1910, an ordinance be drawn based upon the principles enunciated in my letter, I am authorized to say that we shall prepare memoranda of such an ordinance at once, copies of which will be at the disposal of your company and others who may be interested in inspecting them. The city authorities are pleased by your acquiescence in the method of procedure suggested, and we now go forward on the understanding that the public discussions before the Council between representatives of your company and of the city will begin immediately upon the completion of the memoranda."

City Solicitor Schreiber stated at this meeting that he will proceed as rapidly as possible with the preparation of memoranda for the ordinance, and he will have the aid of Mayor Whitlock, Chairman John B. Merrill, of the committee on railroads and telegraph, and others.

Several important points have not yet been decided by the administration. One of them is the question of inserting the rate of fare in the draft that is to be prepared; another is whether the valuation should be placed in the grant before the public discussions are opened.

Program Wisconsin Electrical Association.

The tentative program for the annual meeting of the Wisconsin Electrical Association, which is to be held at the Hotel Pfister, Milwaukee, Wis., on Jan. 18 and 19, 1911, was published in the ELECTRIC RAILWAY JOURNAL of Dec. 24, 1910, page 1249. Under date of Dec. 30, 1910, J. S. Allen, Lake Geneva, Wis., secretary and treasurer of the association, has announced the following definite program:

"Publicity Campaigns."

"Some Principles Established by the Wisconsin Railroad Commission."

"Electric Meter Testing."

"Ornamental Street Lighting."

"Insurance."

"Electric Railway Repair Shop Practice."

Mr. Allen says that the question of holding a banquet on the evening of Jan. 18, 1911, is under consideration by the executive committee of the association. Suggestions are solicited in regard to the convention and the work of the association.

Transit Affairs in New York

The joint committee of the Chamber of Commerce and the Merchants' Association appointed at the Mayor's request to examine the subway problem and report its conclusions has submitted a unanimous report approving the offer of the Interborough Rapid Transit Company and expressing the hope that the plan of subway construction therein proposed would be promptly accepted by the city, in order that the work of construction may begin as soon as possible. The committee examined the question from all sides—that of the financial interests of the city, that of the merit of the routes held out with respect to the accommodation of the public and to the distribution of traffic, and that of the taxpayer and the farepayer. The committee was broadly representative of the city. It contains the names of an ex-Mayor of New York who had also been Mayor of Brooklyn, of an ex-Mayor of Brooklyn, of men of great experience in finance, of men of technical qualifications, engineers and architects, of leading merchants, of men who represent broadly distributed real estate interests, of lawyers and of representatives of the commercial interests of the port. The members of the committee on engineering were Charles Sooysmith, chairman; Alfred P. Roller, William E. McCord, Samuel Rea, Franklin Remington, William J. Wilgus and Seth Low, *ex officio*.

The long-standing dispute over the claims for extra work on the original subway contract has been settled. The Public Service Commission sent to the Board of Estimate and Apportionment a communication which embodied the set-

tlement reached by arbitration after a year and a half or more. It was not a finding by the arbitrators, however, as an agreement had been reached already by representatives of the city and the Interborough interests. It was announced in August that an agreement had been reached by which the city should pay $2,000,000 in settlement of the extra claims. The claim was made under the original contract with John B. McDonald, which the Rapid Transit Subway Construction Company took over. The full amount was $6,198,514.92. This has been reduced to $1,684,109.33.

Association Meetings.

Massachusetts Street Railway Association—Boston, Mass., Jan. 11.

Central Electric Traffic Association—Indianapolis, Ind., Jan. 16.

Wisconsin Electrical Association—Milwaukee, Wis., Jan. 18 and 19.

Central Electric Railway Association—Indianapolis, Ind., Jan. 19.

Interstate Electric Railway Association—Chicago, Ill., Jan. 19. Meeting to organize.

New England Street Railway Club—Boston, Mass., Jan. 26.

American Electric Railway Association—New York, N. Y., Jan. 27, 1911. Mid-year meeting.

Central Electric Accounting Conference—Springfield, Ohio. Date to be fixed.

Public Utility Measure Advocated in West Virginia.—A committee appointed by the State Board of Trade has conferred with Governor Glasscock for the purpose of framing a bill to be presented to the Legislature of West Virginia to create a public service commission to have control of all public utilities in the State. The plan outlined for the bill provides for a non-partisan commission of three persons, with the right to appeal to the courts from the decisions of the commission.

Winnipeg Strike Settled.—The strike of the employees of the Winnipeg (Man.) Electric Railway, which was begun on Dec. 16, 1910, was declared off on Jan. 2, 1911. The company is said to have agreed to reinstate the four men who were discharged for violating the rule of the company which prohibits employees from entering a saloon while in uniform, but to have insisted upon its right hereafter to deal summarily with all men who are found guilty of breaking the rule regarding drinking while in the uniform of the company.

Report by City on Value of Des Moines Property.—The City Council of Des Moines, Ia., has adopted a resolution authorizing Mayor James R. Hanna to negotiate for the services of expert engineers to examine and report on the physical value of the Des Moines (Ia.) City Railway. The Mayor recently introduced a resolution in the Council which provides that the Council approve municipal ownership of street railways and that the legislators elected from Polk County be asked to assist in securing to cities in Iowa the right to acquire, own, operate and lease street railways. Action on this resolution was postponed pending further discussion.

Volume of Business of the Second District Commission in New York.—At the close of business for 1910 the Public Service Commission of the Second District of New York had presented to it for action 2071 different matters. These included 1438 complaints, which were handled informally by the commission and settled without the necessity of formal orders; 371 formal complaints and 262 applications from various corporations for authorization by the commission. During the year the commission disposed of and closed 1670 of the matters presented. During the three years of the commission's existence 5496 matters have been presented to it for action. In addition to daily sessions and consideration of disposition of cases, the commission handled 554 hearings, covering a period of 196 days. During the year the commission authorized capitalization to the amount of $151,048,108. In 1909 there was authorized $142,855,035.85; in 1908, $92,253,900; for the last six months of 1907, $17,730,745.49; a total for the three and a half years of the commission's existence of $403,887,789.34.

Financial and Corporate

New York Stock and Money Market

Jan. 3, 1911.

The opening of the new year brought no relief to the stock market. The conditions that prevailed in 1910 seemed to hold over and the market to-day was dull and inactive. While the prices of stocks have been well maintained, it has only been because there was no trading. Every one in the stock market seems to be waiting the decision of the Supreme Court in the important trust cases. The money market has been higher, but rates have not been prohibitive. Call money went to 7 per cent last week, but this rate held only momentarily. Quotations to-day were: Call, 3¾@6 per cent; 90 days, 3¾@4 per cent.

Other Markets

There has been considerable trading in traction shares on the Philadelphia market during the past week, but prices have not materially changed. Rapid Transit, which is the most active of the lot, closed the year at 18⅝ and was dealt in to-day at about the same price.

In Chicago there has been considerable dealing in Chicago Railways certificates Series 2, but otherwise tractions have been neglected. Prices have not advanced with the activity and the close of the year was 25¼. Other traction securities were not traded in on the market.

In the Boston market during the last week of the old year there was little trading in traction shares. Massachusetts Electric was the most active of the list, but prices for these issues were unchanged.

In the Baltimore market there were some sales of United Railways certificates, but prices were unchanged. The bonds continued to sell at former prices.

Quotations of traction and manufacturing securities as compared with last week follow:

	Dec. 27.	Jan. 3.
American Railways Company	a42½	a42½
Aurora, Elgin & Chicago Railroad (common)	45	a43
Aurora, Elgin & Chicago Railroad (preferred)	*83½	83½
Boston Elevated Railway	128	129
Boston Suburban Electric Companies (common)	*16	a16
Boston Suburban Electric Companies (preferred)	70	a72
Boston & Worcester Electric Companies (common)	a10	a10
Boston & Worcester Electric Companies (preferred)	a39½	a39½
Brooklyn Rapid Transit	a74¾	75¾
Brooklyn Rapid Transit Company, 1st ref. conv. 4s	82⅜	83⅛
Capital Traction Company, Washington	a129	a129
Chicago City Railway	165	165
Chicago & Oak Park Elevated Railroad (common)	*3¼	*3¼
Chicago & Oak Park Elevated Railroad (preferred)	*7¼	*7¼
Chicago Railways, ptcptg., ctf. 1	a95	a100
Chicago Railways, ptcptg., ctf. 2	a25¼	a25¼
Chicago Railways, ptcptg., ctf. 3	a10	a11¼
Chicago Railways, ptcptg., ctf. 4	a6¼	a6½
Cleveland Railway	*91½	*91½
Consolidated Traction of New Jersey	a73	a72
Consolidated Traction of N. J., 5 per cent bonds	a104	a104
Detroit United Railway	*68	*69⅜
General Electric Company	a153¾	a151½
Georgia Railway & Electric Company (common)	a117	117¾
Georgia Railway & Electric Company (preferred)	88	87¼
Interborough-Metropolitan Company (common)	19¼	19¾
Interborough-Metropolitan Company (preferred)	53¼	54¼
Interborough-Metropolitan Company (4½s)	79½	79⅜
Kansas City Railway & Light Company (common)	a22¼	a22¼
Kansas City Railway & Light Company (preferred)	a71½	a72
Manhattan Railway	139	a140
Massachusetts Electric Company (common)	a18½	*18½
Massachusetts Electric Companies (preferred)	a86	a85
Metropolitan West Side, Chicago (common)	21½	a22½
Metropolitan West Side, Chicago (preferred)	a68	a70
Metropolitan Street Railway, New York	*19½	*19½
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	64¾	65¾
Northwestern Elevated Railroad (common)	a22	a22
Northwestern Elevated Railroad (preferred)	a60	a65
Philadelphia Company, Pittsburg (common)	a49¾	50½
Philadelphia Company, Pittsburg (preferred)	a43	43
Philadelphia Rapid Transit Company	a18¼	a18½
Philadelphia Traction Company	83⅜	a84
Public Service Corporation, 5 per cent col. notes	a95¼	a96
Public Service Corporation, ctfs.	a100½	a100½
Seattle Electric Company (common)	a108	a106½
Seattle Electric Company (preferred)	a102	a102½
South Side Elevated Railroad (Chicago)	69½	a72
Third Avenue Railroad, New York	10	10
Toledo Railways & Light Company	a8	a8
Twin City Rapid Transit, Minneapolis (common)	108½	a109
Union Traction Company, Philadelphia	a42⅜	a43½
United Rys. & Electric Company, Baltimore	*14½	*14½
United Rys. Inv. Co. (common)	a15	31⅝
United Rys. Inv. Co. (preferred)	*52	60
Washington Ry. & Electric Company (common)	a33¾	a33¾
Washington Ry. & Electric Company (preferred)	a86¼	86½
West End Street Railway, Boston (common)	a91	a91
West End Street Railway, Boston (preferred)	a101	a103
Westinghouse Elec. & Mfg. Co.	66	66
Westinghouse Elec. & Mfg. Company (1st pref.)	*124	*124

a Asked. *Last sale.

Annual Report of the Boston Elevated Railway

The thirteenth annual report of the Boston Elevated Railway covers the period of nine months ended June 30, 1910. This is due to the fact that the fiscal year has been changed by the Board of Railroad Commissioners so as to end on June 30, instead of Sept. 30. A summary of the business for nine months is as follows:

Gross earnings from operation		$11,383,686
Operating expenses		7,321,396
Net earnings from operation of owned and leased lines		$4,062,290
Interest accrued and charged to construction account		135,998
		$4,198,288
Subway rental	$158,813	
Less amount collected from the Boston & Northern St. Ry.	20,189	
	$138,622	
Interest on funded debt of West End St. Ry.	510,135	
Dividend on preferred stock of West End St. Ry., 8 per cent	384,000	
Dividend on common stock of West End St. Ry., 7 per cent	583,808	
Dividend on stock of Somerville Horse R. R., 6 per cent	6,885	
Taxes on West End St. Ry	468,033	
Interest and taxes on leased property of the Old Colony St. Ry	35,601	
Interest on leased property of the Boston & Northern St. Ry	678	
Total payments on account of leased railways		2,127,762
		$2,070,526
Interest on funded debt	$417,000	
Taxes, Boston Elevated Ry	342,417	
Compensation and income taxes	106,239	
Washington Street tunnel rental	255,000	
East Boston tunnel rental	41,674	1,162,330
Balance		$908,196
Dividend paid Feb. 15, 1910, 3 per cent	$598,500	
Dividend reserve	299,250	897,750
Surplus for nine months		$10,446

The details of gross earnings and operating expenses are as follows:

EARNINGS FROM OPERATION:		
From passengers carried		$10,984,441
From carriage of mails		28,006
From tolls for use of tracks by other companies		31,518
From rentals of real estate		106,152
From advertising		87,047
From interest on deposits, etc		138,064
From miscellaneous income		8,458
Total		$11,383,686
OPERATING EXPENSES:		
For general expenses		$862,443
For maintenance of roadway and buildings		831,538
For maintenance of equipment		736,871
For transportation expenses		4,890,544
Total		$7,321,396

William A. Bancroft, the president, states in part in his report to the stockholders:

"No additional capital stock has been authorized during the nine months covered by this report. At the close of the last fiscal year the capital outstanding amounted to $13,450,100, and there were capital stock subscription payments to the amount of $4,520,075, covering payments on account of subscriptions to the stock authorized by the vote of the stockholders of Nov. 18, 1908, and by the order of the Board of Railroad Commissioners of Dec. 18, 1908. The final subscription due Jan. 25, 1910, has all been paid, and the capital outstanding as shown in the balance sheet is now $19,950,000, par value.

"The year has been one of activity on the company's part.

"The construction of the East Cambridge elevated extension has been continued. The temporary bridge has been removed, the piers completed, and eight concrete arches are nearly completed. Portions of the foundations in both East Cambridge and Boston have been completed, plans for the station on Causeway Street in front of the Boston & Maine Railroad station have been approved by the Railroad Commissioners, and contracts for the steel work for the extension have been let.

"In connection with the Forest Hills extension tracks have been laid in the terminal yard to connect by incline with the elevated structure on Washington Street.

"At Dudley Street the platforms have been extended, and miscellaneous changes made for the purpose of providing for the increased business. The waiting rooms on the upper level have been completed, and many alterations made for the comfort and convenience of our patrons at this point, upon the three levels now in use. Little remains to be done to provide for the operation of 8-car trains at this station.

"The route of the Malden and Everett elevated extension has been approved by the Railroad Commissioners, and a portion of the land has been purchased. The engineers are now designing the structure and stations.

"Plans for the alterations of the Sullivan Square station for the operation of the Malden extension, for 8-car trains, and for separate platforms for in and out passengers have also been approved by the Railroad Commissioners.

"Upon the Cambridge Main Street subway construction work has been pushed vigorously during the year. The main line is now substantially completed, except portions of the Harvard Square station and of the terminal yard.

"At the South Station the elevated structure has been changed to provide for a shuttle track to accommodate trains between the North and South stations.

"The Railroad Commissioners have approved the route for the elevated structure in Boston, between the Boston end of the Cambridge bridge and the Beacon Hill tunnel, which the Boston Transit Commission is now constructing.

"At the Thompson Square station changes in the steel work for track structure, incident to changing the platforms for 8-car trains, are now completed. The material for the platform changes has been delivered.

"The Railroad Commissioners have determined that we should build an elevated station at Green Street in Jamaica Plain, and plans therefor have been approved.

"On the surface an additional track has been laid on Hyde Park Avenue, so that that thoroughfare is now double-tracked to the Hyde Park line.

"On Oct. 27 last cars began to run over the Mystic Avenue bridge, on the Middlesex Fells line, enabling the company to abandon the Union Street tracks and to run its cars direct.

"A large lot of land, containing nearly 24 acres, situated in South Boston at tide water, has been purchased as a site for a power station. Contracts have been made with the Stone & Webster Engineering Corporation for the erection thereon of a large coal unloading and coal storage plant, and also for the erection of a power station, to contain turbo-generators of the largest type, designed to supply an alternating current system, together with a distributing system, and the provision of transformer stations, to be located at suitable points.

"Besides its ordinary taxes the company's contribution to the public during the 12 months ending Sept. 30 amounted to at least $497,307, made up as follows:

Compensation tax for the use of streets under the acts of 1897	$130,846
Interest at 4 per cent. on $4,382,000, cost of paving laid in streets by company	175,280
Cost of maintaining street paving by company	105,236
Amount of subway rental devoted to sinking fund	51,945
Moving snow removed from sidewalks and roofs (estimated), not less than	34,000
Total extraordinary payments to the public	$497,307
Add taxes assessed on real estate	308,843
Add taxes assessed on capital stock and income	703,864
Total	$1,510,014
To the above may be added the balance of subway rental	132,378
Also the rental of the East Boston tunnel	56,077
Also the rental of the Washington Street tunnel on account	336,000
Grand total, which is about 13.2 per cent of the gross revenue of the company for the year	$2,034,469

"Concerning the capitalization of the properties owned and leased by this company, your directors wish you to know that the capital stock of the West End Street Railway Company on June 30, 1910, was as follows: Preferred, $6,400,000; common, $11,120,150; total, $17,520,150. Of this capitalization the preferred stock was the amount authorized by the Legislature for the purchase of the horse railroads which made up the West End system, and was considered only the value of these properties. Of the common stock $7,150,000 was paid in in cash at par, and the balance was sold under orders of the Railroad Commissioners for cash at prices ranging from 40 to 80 per cent in excess of the par value, realizing a premium of $1,978,331.

"Of the $19,950,000 par value of the stock of the Boston Elevated Railway the first $10,000,000 was paid in in cash at par, and the balance was sold under orders of the Railroad Commissioners for cash at a price of from 10 to 55 per cent in excess of the par value, realizing a premium of $2,510,958 above the par value. The capitalization of the two companies on June 30, therefore, represents an actual payment

in cash of $4,489,289 above the par value of the outstanding stock. So there is not only no capital inflation of these properties, but much more has been paid in than is represented by the par value of the stocks. The dividends paid on the stocks and the interest paid on the bonds of the two companies make an average return to the capital invested of 5.15 per cent per annum. It is not true, therefore, of these properties that 'excessive dividends are paid on watered stock.'

"From the summary of stockholders of record June 30, 1910, it appears that the total number is 4539, holding 199,500 shares of stock. Of these 4014, holding 176,799 shares, live in Massachusetts. In other words, over 88 per cent of the stock is held in Massachusetts. The average number of shares held by each stockholder of the company is a little less than 44 shares.

"The total length of surface tracks controlled by the company is now 461.049 miles. This, with the elevated mileage of 24.170 miles, makes a total mileage of 485.219.

"For a number of years there have been petitions to the Legislature for the construction of more subways in various parts of the community than there is any probable revenue to support. Moreover, interested people have endeavored to give the impression that the company has not accepted or built additions or extensions.

"To show to the public that the company has in fact accepted, built and undertaken large additions and extensions, during the months of September, October and November last we advertised in the newspapers by map and statement a recital of the additions and extensions which have been made to our system since we began to operate it in 1898, together with the funds which have been provided therefor.

"We showed that when this company took charge the population of the cities and towns in which it operates was approximately 843,090. Now it is approximately 1,098,917—an increase of only about 30 per cent. At the beginning of the period there was invested $25,960,000. To-day the investment stands at $81,440,000—an increase of 213 per cent.

"Our advertisements, in reply to the charge that we have not been progressive, of course, show conclusively that the company's accomplishments and undertakings have far outstripped the growth of the community in which we operate, so far as that growth is represented by population and wealth, progressing eight times as fast as the population and five times as fast as the wealth. Not only have we been extremely progressive, but obviously for the present we must act with caution in respect to future extensions."

Traffic statistics compare as follows:

	Nine Months Ended June 30, 1910.	Year Ended Sept. 30, 1909.	1908.
Round trips	4,299,705	5,549,774	5,571,459
Revenue car miles, surface	$32,890,016	$43,599,806	$43,818,610
" " " elevated	6,234,967	7,295,450	7,806,503
" " " U. S. mail cars	171,530	232,425	232,716
" " " total	39,296,522	51,127,681	51,857,889
Total revenue passengers carried	$220,127,890	$281,008,471	$273,132,584
Average receipts per passenger	$.04990	$.04991	$.04980

Metropolitan Street Railway Reorganization Plan Filed with Commission

The joint committee on reorganization of the Metropolitan Street Railway, of which Guy E. Tripp, of Stone & Webster, is chairman, filed with the Public Service Commission of the First District of New York, on Dec. 20, 1910, a petition asking the approval of a plan of reorganization of the company prepared by the joint committee with the sanction and co-operation of the committee representing the 5 per cent general mortgage bonds and the committee representing the 4 per cent refunding mortgage bonds. Briefly, the plan provides for a total of securities of about $96,000,000, including new securities and old securities which will be allowed to remain undisturbed. This is a reduction of about $40,000,000 from the present outstanding securities and obligations. The new securities to be issued are approximately as follows: $11,768,000 of new fixed-charge 4 per cent bonds; $39,000,000 of new adjustment income bonds and $14,000,000 of stock. The fixed charges represented by the interest on the bonds have been reduced by more than $1,000,000 a year by the readjustment.

The holders of the stock and improvement notes of the Metropolitan Street Railway are given the right of participation on the payment of an assessment sufficient to furnish the new cash needed, which it is estimated will not exceed $10,000,000. The plan does not, however, provide for the participation of the Metropolitan Securities Company or the New York City Railway. A novel feature is that, subject to the permission of the Public Service Commission, the holders of personal injury claims are offered the right to participate under the same terms as the most favored bondholder. No assessment is required of these tort claimants. Ford, Bacon & Davis, the experts employed by the receivers, have prepared an inventory and appraisal of the properties of the system which show a valuation largely in excess of the total securities to be outstanding after the adoption of the plan. A summary of the plan follows:

Decrees of foreclosure, respectively, of the $12,500,000 general mortgage and of the $16,604,000 refunding mortgage have been entered by the court, and the said properties subject thereto ordered to be sold under these decrees. The joint reorganization committee contemplates the purchase of these properties at the sale. It is proposed that a new railroad corporation shall be formed under the provisions of Sections 9 and 10 of the stock corporation law. In accordance with the provisions of the statutes of the State of New York the joint committee proposes to utilize for the consummation of such proposed purchase, to wit:

Outstanding Securities of System:		
Bonds, debentures and collateral notes		$57,285,000
Stocks		67,900,000
Total		$125,185,000
Less Those to be Acquired Under Foreclosure:		
Bonds	$3,700,000	
Stocks	5,792,000	
		9,492,000
Total held by public		$115,693,000

Added to the above $115,693,000 held by the public the following special items are to be included: Improvement notes made by the Metropolitan Street Railway to the Metropolitan Securities Company, $4,000,000; allowances decreed by the court in favor of the tort claimants, the full amount of which is estimated to be $1,875,000; a maximum estimate of cash requirements, $10,000,000; accrued and defaulted interest on the following bonds and notes held by the public, and interest thereon, as of Oct. 1, 1910:

On 5 per cent. bonds	$2,116,969
On 4 per cent. bonds	[illegible]
On Central Crosstown notes	92,635
On Metropolitan Crosstown first mortgage bonds	78,884
Total	$4,383,250

This places the total of public holdings and special items at $135,951,250. Regarding the above amount of $10,000,000 estimate of cash requirements, the plan states that the minimum of the bids which the court has authorized to be accepted at the foreclosure aggregate $12,000,000. It is stated to be certain that a sum not to exceed the above maximum estimate will ultimately and in any event be required to be paid under a purchase made for the purpose of this plan. Out of this fund the outstanding receivers' certificates, substantially $6,500,000, claims adjudged or which may be adjudged to be preferential, receivers' liabilities and obligations, costs, allowances and other sums ordered to be paid by the court will have to be met, and in addition the charges and expenses of reorganization will be provided for.

Securities to Remain Undisturbed:		
Bonds		$25,646,000
Stocks		[illegible]
Total		[illegible]
Less those to be acquired under foreclosure		9,492,000
Total held by public		$31,454,000

The $9,492,000 to be acquired on the foreclosure are securities to be pledged under a new mortgage or held as muniments of title, or canceled, or otherwise disposed of to effectuate the plan.

Securities to be Readjusted:		
Bonds		$31,309,000
Stocks		52,600,000
Total		$84,239,000
To which must be added for special items aforesaid:		
Improvement notes		4,000,000
Tort claimants		1,875,000
Interest as above stated		4,383,250
Cash requirements, estimated		10,000,000
Total		$104,497,250

The total of new securities, as proposed, will consist of the following:

New 4 per cent. bonds	$11,768,100
New adjustment bonds	38,933,400
Stock	14,150,000
Total	$64,851,500

The Public Service Commission has fixed Jan. 11, 1911, as the date for the hearing on the proposed plan for reorganization of the Metropolitan Street Railway.

Chicago Railways

On Dec. 27, 1910, Judge Grosscup, of the United States Circuit Court at Chicago, signed the necessary orders providing for the payment of the various judgments and claims against the Chicago Consolidated Traction Company on a compromise basis and ending the receivership, and also confirmed the sale of the property of the company and its subsidiaries on Nov. 30, 1910, to Andrew Cooke, and the sale by him of all the property of the Chicago Consolidated Traction Company within the city limits of Chicago to the Chicago Railways and the property outside of the city to the County Traction Company. The sale of the property of the Chicago Consolidated Traction Company under foreclosure was referred to in the ELECTRIC RAILWAY JOURNAL of Dec. 10, 1910, page 1170, and the acceptance by the Chicago Railways of the ordinance passed by the city which granted it permission to absorb the Chicago Consolidated Traction Company was noted in the ELECTRIC RAILWAY JOURNAL of Dec. 17, 1910, page 1212.

On Dec. 28, 1910, the day following the orders of Judge Grosscup, the physical connection between the lines of the old Consolidated Traction Company within the city limits and those outside of the city was broken and passengers coming into the city over the lines of the County Traction Company, or going out of the city on the lines of the Chicago Railways Company, formerly operated by the Chicago Consolidated Traction Company, were required to pay an extra fare. As the public had not been fully informed in regard to the change considerable disorder resulted among passengers. On Dec. 29, 1910, a compromise was arranged whereby passengers from all the suburbs will be carried to and from the city until Feb. 12, 1910, for a 5-cent fare. Heated shelters will be provided for the convenience of passengers at the city limits. The resolution providing for the temporary armistice which was adopted by the various bodies which represented the public in the negotiations with the companies follows:

"Whereas, The Chicago Railways has expressed a willingness to enter into an arrangement for the period and upon the terms hereinbefore stated, provided the entering into the performance of such an arrangement on its part shall be without prejudice to its legal rights; and,

"Whereas, The arrangement above referred to shall commence within 24 hours after the passage and approval of this ordinance and shall continue from such time until and including Feb. 12, 1911, and shall at midnight of that day cease and determine; and,

"Whereas, Said arrangement is as follows: 'First, the Chicago Railways during said period shall give without charge to any passenger upon its railway lines desiring same a transfer entitling such passenger to transportation over connecting lines of the County Traction Company located in this municipality.

"'Second—The Chicago Railways shall cause such transfers above mentioned to be honored during said period by the County Traction Company.

"'Third—The Chicago Railways shall make arrangements with the County Traction Company, which said last-named company shall give during said period to each passenger without charge from its lines of railway desiring same a transfer entitling such passenger to transportation over connecting lines of the Chicago Railways to the business district of Chicago and intermediate points.

"'Fourth—The Chicago Railways shall honor upon its lines between the city limits and the business district of Chicago such transfers so given by the County Traction Company during said period.'

"Therefore, Be it and it is hereby ordained:

"Section 1—That if the Chicago Railways will enter into and carry out the above-mentioned arrangement during the period aforesaid, this municipality shall not claim or insist that by virtue of the entering into and carrying out of such arrangement the Chicago Railways loses or prejudices any of its legal rights, and that during the continuance of such arrangement and until the expiration thereof this municipality shall not commence or prosecute or allow to be commenced or prosecuted in its name or on its behalf against the Chicago Railways any action at law or in equity, or prior to the date of the termination of said period upon any grounds or for any relief whatever, provided that nothing herein contained shall be construed as affecting or prejudicing any rights of the municipality of any kind whatsoever against the Chicago Railways which the municipality may seek to have enforced after the expiration of said period.

"Section 2—If the County Traction Company shall be prevented by the action of any municipality, its officers or agent from operating its cars from the city limits of Chicago to and from that part of said lines lying within this municipality, the Chicago Railways shall be under no obligations to carry out said arrangement, and may terminate said arrangement as to the line or lines of street railway so affected, nor shall the Chicago Railways be under any obligations to carry out such arrangements unless and until the villages of ——— and ——— have each passed an ordinance of the same tenor as this ordinance."

Street Railway Bonds and Massachusetts Savings Banks

In accordance with Chapter 590 of the Acts of 1908, the Massachusetts Railroad Commission has transmitted to the Bank Commissioner the following list of street railways which have annually earned and properly paid, without impairment of assets or capital stock, dividends at the rate of 5 per cent or over upon their outstanding capital stock in each of the five preceding years: Boston Elevated Railway, Boston & Northern Street Railway, Boston & Revere Electric Street Railway, Citizens' Electric Street Railway, Dartmouth & Westport Street Railway, East Middlesex Street Railway, Fitchburg & Leominster Street Railway, Holyoke Street Railway, Springfield Street Railway, Union Street Railway, West End Street Railway, Worcester Consolidated Street Railway. The bonds of these companies are legal investments for savings banks in Massachusetts.

Alton, Jacksonville & Peoria Railway, Jerseyville, Ill.—George M. Seward & Company, Chicago, Ill., as fiscal agents of the Falkenau Electric Construction Company, Chicago, Ill., offer for subscription at 95 and interest, with a 40 per cent stock bonus, the unsold portion of a block of $100,000 of first mortgage 5 per cent 30-year gold bonds of the Alton, Jacksonville & Peoria Railway, dated July 1, 1910, and due July 1, 1940, but redeemable at 105 after July 1, 1920. The Alton Banking & Trust Company, Alton, Ill., is trustee of the issue. The total authorized issue of bonds is $600,000.

City Railway, Los Angeles, Cal.—The City Railway, which was incorporated recently to build new extensions and new lines for the Los Angeles Railway Corporation, will issue a mortgage for $5,000,000 to cover the new lines when built. The City Railway has a capital stock of $5,000,000, fully subscribed, all of which is owned by the Los Angeles Railway Corporation.

Coney Island & Brooklyn Railroad, Brooklyn, N. Y.—The Public Service Commission of the First District of New York has granted permission to the Coney Island & Brooklyn Railroad to issue $500,000 of 3-year 6 per cent notes, to be redeemable at 101. The purposes for which the money will be used follow: (1) For reconstruction and relocation of railroad on Coney Island Avenue, from Prospect Park to Coney Island, $354,945.50. (2) To discharge or refund obligations, $36,684.93. (3) To pay for or on account of the reconstruction of railroad on Franklin and De Kalb Avenues, the relaying of the rails on Smith Street, and paving all three streets, $98,369.57. (4) To pay the expenses of the sale of the notes authorized and the discount thereon caused by the sale at 98 per cent of the face value, $10,000.

Denver (Col.) City Tramway.—The Metropolitan Railway, Denver, has made provision for the redemption of its first mortgage 6 per cent gold bonds on Jan. 1, 1911, at the office of the Mercantile Trust Company, New York.

Pursuant to the terms of the first and refunding sinking fund mortgage 25-year 5 per cent gold bonds of the Denver City Tramway, $953,000 of these bonds are authorized to be issued to pay off the bonds of the Metropolitan Street Railway, and the latter may be exchanged for the bonds of the Denver County Tramway referred to prior to Jan. 1. The exchange may be made at the office of Clark, Dodge & Company, New York, or the International Trust Company, Denver, the Metropolitan Railway bonds to be received at 100 and accrued interest to Jan. 1 for the Denver City Tramway bonds at 95 and accrued interest to date of exchange, or, if exchange is not desired, the bonds of the Metropolitan Railway will be purchased at 100 and accrued interest to date of delivery.

Hocking-Sunday Creek Traction Company, Nelsonville, Ohio.—The Hocking-Sunday Creek Traction Company has made a mortgage to the Columbus Savings & Trust Company, as trustee, to secure an authorized issue of $200,000 of first mortgage, 6 per cent, 20-year gold bonds, dated Nov. 1, 1910, issuable at $13,333 per mile of road.

Louisville & Eastern Railroad, Louisville, Ky.—The property of the Louisville & Eastern Railroad was purchased at foreclosure sale on Jan. 3, 1911, by the Louisville & Interurban Railroad, a subsidiary of the Louisville Railway, for $1,000,000, the upset price.

Manistee Light & Traction Company, Manistee, Mich.—The property of the Manistee Light & Traction Company will be sold at the Court House in Manistee on Jan. 18, 1911, by order of the United States District Court.

New Orleans Railway & Light Company, New Orleans, La.—Bertron, Griscom & Jenks, New York, N. Y., and Philadelphia, Pa., offer for subscription at 83 and interest the unsold portion of $500,000 of general mortgage 4½ per cent gold bonds of the New Orleans Railway & Light Company, dated July 1, 1905, and due July 1, 1935, but redeemable, in whole or in part, after 60 days' notice, on any coupon date at 105 and interest.

Old Colony Street Railway, Boston, Mass.—The Railroad Commission of Massachusetts has been asked to approve an issue of $300,000 of additional common stock of the Old Colony Street Railway on account of extensions, equipment, etc.

St. François County Railway, Farmington, Mo.—The St. François County Railway, the property of which was sold under foreclosure in August, 1910, has been succeeded by the St. François County Railroad, which has elected officers as follows: M. P. Cayce, president; William P. Taylor, vice-president, general manager and purchasing agent; William P. Lang, secretary; F. V. Isenman, general freight and passenger agent.

St. Louis (Mo.) Terminal Electric Railway.—The St. Louis Terminal Electric Railway, which is controlled by the McKinley interests, has filed for record in Missouri a certificate increasing its authorized capital stock from $1,000,000 to $2,000,000.

South Shore Traction Company, Patchogue, N. Y.—Judge Chatfield, of the United States Circuit Court, on the application of Paul T. Brady, appointed Paul T. Brady and Willard V. King receivers of the South Shore Traction Company, on Dec. 31, 1910.

Syracuse (N. Y.) Rapid Transit Railway.—William H. Newman, formerly president of the New York Central & Hudson River Railroad, has been elected a director of the Syracuse Rapid Transit Railway to succeed the late E. V. W. Rossiter.

Third Avenue Railroad, New York, N. Y.—Justice Amend of the Supreme Court has granted a writ of certiorari giving the Public Service Commission of the First District of New York 20 days within which to file in the county clerk's office all the records of protests before it and decisions upon which it refused to approve the plans for the organization of the Third Avenue Railroad dated Dec. 2, 1909, and further agreement of plan of readjustment dated Feb. 23, 1910. The suit was brought by the Third Avenue Railroad and by James N. Wallace and others of the bondholders' committee.

West Chester, Kennett & Wilmington Electric Railway, Kennett Square, Pa.—In the Electric Railway Journal of Dec. 17, 1910, page 1215, mention was made of the appointment of a protective committee, consisting of R. J. Brunker, Geo. B. Atlee, Morris Ebert and Wm. S. J. Wetherill, as the result of the default of the West Chester, Kennett & Wilmington Electric Railway in the payment of the coupons of its $420,000 of 5 per cent bonds dated 1905, which are outstanding. George B. Atlee & Company, Philadelphia, Pa., now state that sufficient bonds have been deposited with the committee, which they represent, to permit foreclosure.

Wilmington, New Castle & Southern Railway, New Castle, Pa.—Solomon Hanford, New York, N. Y., purchased at foreclosure sale, on Dec. 23, 1910, the portion of the Wilmington, New Castle & Southern Railway, between Wilmington and New Castle, covered by the first mortgage of the Wilmington & New Castle Railway, which was dated 1896, and drawn for $150,000. The purchase price was $100,000. Mr. Hanford is said to represent E. Clarence Jones & Company, New York, N. Y.

Dividends Declared

Auburn & Syracuse Electric Railroad, Syracuse, N. Y., quarterly, 1½ per cent, preferred.

Aurora, Elgin & Chicago Railroad, Chicago, Ill., quarterly, 1½ per cent, preferred; quarterly, ¾ of 1 per cent, common.

Birmingham Railway, Light & Power Company, Birmingham, Ala., 3 per cent, preferred; 2½ per cent, common.

Boston & Northern Street Railway, Boston, Mass., $3, preferred.

Boston (Mass.) Suburban Electric Companies, $1, quarterly.

Cedar Rapids-Iowa City Railway & Light Company, Cedar Rapids, Ia., 3 per cent, preferred.

Consolidated Traction Company of New Jersey, Newark, N. J., 2 per cent.

Denver & Northwestern Railway, Denver, Col., 2 per cent, quarterly.

Ft. Smith Light & Traction Company, Ft. Smith, Ark., quarterly, 1¾ per cent, preferred.

Indianapolis Traction & Terminal Company, Indianapolis, Ind., 1 per cent.

Little Rock Railway & Electric Company, Little Rock, Ark., 3 per cent, preferred; 4 per cent, common.

Manchester Traction, Light & Power Company, Manchester, N. H., quarterly, 2 per cent.

Memphis (Tenn.) Street Railway, quarterly, 1¼ per cent, preferred.

Nashville Railway & Light Company, Nashville, Tenn., quarterly, 1¼ per cent, preferred; quarterly, ¾ of 1 per cent, common.

New England Investment & Security Company, Boston, Mass., 2 per cent, preferred.

New Orleans City Railroad, 2½ per cent, preferred; 1 per cent, common.

New York State Railways, Rochester, N. Y., quarterly, 1¼ per cent, preferred; quarterly, 1¼ per cent, common.

Old Colony Street Railway, Boston, Mass., $3, preferred.

Ottawa (Ont.) Electric Railway, 2½ per cent; 2 per cent extra.

Ottumwa Railway & Light Company, Ottumwa, Ia., quarterly, 1¾ per cent., preferred.

Philadelphia (Pa.) City Passenger Railway, $3.75.

Porto Rico Railways, Ltd., San Juan, P. R., quarterly, 1¾ per cent, preferred.

Public Service Corporation of New Jersey, quarterly, 1¼ per cent.

Ridge Avenue Passenger Railway, Philadelphia, Pa., quarterly, $3.

St. Charles Street Railroad, New Orleans, La., 3 per cent.

Scioto Valley Traction Company, Columbus, Ohio, quarterly, 1¼ per cent, preferred and first preferred.

Syracuse (N. Y.) Rapid Transit Company, quarterly, 1½ per cent, preferred.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., quarterly, 1¼ per cent, preferred.

Toronto (Ont.) Railway, quarterly, 1¾ per cent.

Tri-City Railway & Light Company, Davenport, Ia., quarterly, 1½ per cent, preferred.

Union Railway, Gas & Electric Company, Rockford, Ill., quarterly, 1½ per cent, preferred.

West End Street Railway, Boston, Mass., $2 preferred.

West India Electric Company, Ltd., Kingston, Jamaica, 1¼ per cent.

Traffic and Transportation

Transfer Talks in Toledo

The Toledo Railways & Light Company, Toledo, Ohio, has placed reading matter on all transfers. For the last few weeks the following has appeared on the transfers:

"If there is any dispute over this transfer, pay your fare, keep the transfer and refer matter to company. Conductors are governed by certain fixed rules, and to avoid disputes take up complaints direct with company.

"We would also consider it a favor to be notified when a conductor is not courteous or polite to our passengers, but don't blame the conductor if it's your own mistake."

The company intends to change the transfer talks at frequent intervals and has prepared a second transfer talk, to read as follows:

"Twenty-five years ago people rode in horse cars. They paid a 5-cent fare, received no transfer and could not ride over two or three miles.

"To-day electric cars take you five times as far, five times as quickly and five times more comfortably. Despite enormous increased operation expense the fare is still 5 cents.

"Doesn't this show the important part electric roads play in contributing to the public welfare?"

Subway Service Order Protested

The Interborough Rapid Transit Company, New York, N. Y., has filed a protest with the Public Service Commission of the First District of New York against the order of the commission dated Dec. 23, 1910, which fixes the conditions of service on the subway lines of the company, and the commission has set Jan. 12, 1911, for a rehearing on its order. The question of service came before the commission in a series of hearings which were reported in the issues of the ELECTRIC RAILWAY JOURNAL of Dec. 10, 1910, page 1152; Dec. 17, 1910, page 1206, and Dec. 31, 1910, page 1271, in the last of which the order of the commission requiring the company to reduce from 30 minutes to 15 minutes the time within which to supply seats sufficient for all passengers or to operate the maximum service at all hours was referred to. The objections made by the company to the order follow:

"That the terms of said order and the regulations therein attempted to be made are impossible of performance.

"That said order makes no provision for the temporary prevention of this company from complying with said order by accident or other controlling emergency for which it is not responsible, and that in this respect said order and its terms and each of them are unjust and unreasonable.

"That said order deprives this company of the right of ownership and management and protection of its property and the property of others committed to its care.

"That said order illegally substitutes the judgment of the commissioners for the judgment of this company's directors and stockholders with respect to the matters which it attempts to regulate.

"That said order impairs the obligation of contracts to which this company is a party, in violation of the Constitution of the State of New York and in violation of the Constitution of the United States.

"That the law under which said commission purports to act, being Chapter 48 of the Consolidated Laws, known as the public service commissions law, enacted by Chapter 480 of the Laws of 1910, is unconstitutional as not having been duly enacted in accordance with the Constitution of the State of New York and as being contrary to the provisions thereof; that the sections of said law under which the commission acted or purported to act herein are unconstitutional and deprive owners of property of their property without due process of law and discriminate unjustly between classes of property owners.

"That the regulations attempted to be fixed and enforced by the order of the commission hereinabove referred to are not, nor are any of them, just or reasonable.

"That the determination made by the said order and each and every part thereof is against the evidence submitted to the commission and against the weight of such evidence and is wholly without support or justification on any evidence submitted to the commission.

"The commission is hereby respectfully notified that the terms of the order modifying final order purporting to have been made on Dec. 28, 1910 (excepting paragraphs marked 2, 3 and 4, which are accepted and will be obeyed and are not referred to hereinafter), are not accepted, and that it is a physical impossibility for the Interborough Rapid Transit Company to obey said order."

The paragraphs which the company indicates that it accepts provide for the discontinuance of the expresses which have heretofore skipped all stations between Ninety-sixth Street and 137th Street, and the operation of every other Broadway local train to Dyckman Street instead of their withdrawal at 137th Street, as has been the custom. This change is devised to relieve the crowded condition on the Broadway branch, and was put into effect on Jan. 3, 1911.

Relations of Boston Elevated Railway with Employees

William A. Bancroft, president of the Boston (Mass.) Elevated Railway, refers as follows to the relations of the company with its employees in the annual report of the company, an abstract of which is published on page 47 of this issue of the ELECTRIC RAILWAY JOURNAL:

"The company has continued its liberal policy toward its employees in respect to their wages, as well as in other matters. Compensation for learners during 12 months ending Sept. 30 amounted to $37,813. There was paid during 12 months ending Sept. 30 the sum of $6,869, as a guaranteed minimum wage for new or extra men. There was also paid as increased compensation to long-service men the sum of $71,895. There was paid in pensions, under the provisions recited in former reports, the sum of $11,260. There was also paid in 'satisfactory service' money, in sums of $20 or $25 to each of the employees deemed worthy thereof, the sum of $74,130. The aggregate sum of increased payments to employees, under the provisions adopted seven years ago, amounted during the year to $201,969. The provisions of four years ago and this year raising the rate of wages increase this amount by about $201,012, making a total of about $402,981."

Pensions for Public Service Employees

The Public Service Corporation of New Jersey and its allied companies will provide, after Jan. 1, 1911, old age pensions, sick and accident benefits and life insurance for all its permanent employees of the various railway, gas and electric companies. The entire cost will be borne by the companies without any expense to the men.

Approximately 10,000 employees will be affected by the benefit scheme. The annual cost to the companies will, it is estimated, be upward of $50,000.

The Public Service will pay sick or disabled employees $1 per day for not more than 90 days in any one year; the smallest pension to be paid will be $240 a year and at the death of an employee $300 will be paid to his dependents.

Employees who reach the age of 65 years after 25 years of continuous service with the corporation, its allied or predecessor companies will be eligible to retire on pension. Compulsory retirement is provided for when an employee shall have reached the age of 70 years, after 20 years of continuous service. Pensions are to be paid monthly by the employing company and are to be fixed on a basis of percentage of the average compensation of the person pensioned. This is to be for each year of service 1 per cent of the average salary for the 10 years preceding retirement, but with the proviso that no pension shall be less than $240 a year. It is also provided that if an employee does not voluntarily retire when he reaches the age of 65 years he may, if he likes, do so at any time before reaching the compulsory retirement age.

The insurance feature provides that $300 will be paid at death to the dependents of permanent employees whose compensation at the time of death does not exceed $1,800 a year. Those receiving more than $1,800 a year do not come within the scope of the insurance plan.

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In the payment of benefits to sick or injured employees it is stipulated that no money will be given in cases where the disability is due to immoral conduct or the use of intoxicants. Nor will the employees who receive $1,800 per year or more and those whose regular pay is continued during disability share in the sick benefit fund. All others will, after the first week of disablement, be paid at the rate of $1 a day for not more than 90 days in any one year. Employees receiving a pension will not be entitled to sick benefits also, but retirement on pension will not deprive any employee of the benefits of insurance.

The administration of the beneficial funds has been placed in the hands of a welfare committee, which consists of the president, the second vice-president, who is chairman, the treasurer and the general claim agent. It is figured that for the first four years at least the companies will have to spend annually for pensions $12,000; for insurance, $21,600; for sick benefits, $17,900, a total of $51,500. The necessary money will be appropriated annually, properly apportioned among the several companies and charged to operating expenses.

Collision on Oregon Electric Railway.—Sixteen persons were injured in a head-on collision at 9:15 p. m., on Dec. 14, 1910, between a limited car and a local car on the Puget Sound Electric Railway, between Seattle and Tacoma.

Safety Gates in Louisville.—The Louisville (Ky.) Railway is experimenting with safety gates, and will install the gates on all of its cars, if after trial they prove successful. The gates on the Louisville cars will be operated by the conductor.

Increase in Wages by Toledo, Fostoria & Findlay Railway.—On Jan. 1, 1911, the Toledo, Fostoria & Findlay Railway, Fostoria, Ohio, increased the wages of all motormen and conductors who have been in the employ of the company three years 1 cent an hour.

Lehigh Valley Transit Company, Allentown, Pa.—This company has issued a calendar for 1911, accompanied by a circular letter extending the season's greetings and telling of the new rapid transit express service at freight rates between Philadelphia and Allentown, and intermediate points.

Special Attendants in Kansas City, Mo.—The Metropolitan Street Railway, Kansas City, Mo., placed 30 uniformed men at the principal points in the downtown trading district during the holiday season to assist and direct passengers of the company and otherwise promote their comfort.

Near-Side Ordinance in Connersville, Ind.—The city attorney of Connersville has prepared an ordinance for introduction in the City Council of Connersville, Ind., to compel the Indianapolis & Cincinnati Traction Company, which operates through Connersville, to stop its cars on the near side of the street in that city.

Special Transfer for New Year's.—The St. Joseph Railway, Light & Power Company, St. Joseph, Mo., used a special decorated transfer on Jan. 1, 1911, 2¾ by 5 in. in size, and printed in red and green. The upper half of the slip bore a New Year greeting from the company to the passenger. The border design was a reproduction of holly leaves and berries.

Effect of Cold Weather at Akron.—Early on the morning of Dec. 30, 1910, 25 poles carrying the power lines of the Northern Ohio Traction & Light Company, the wires of the two telephone companies and the police and fire wires broke and fell into South Main Street, Akron, Ohio, paralyzing street car service for hours, except in the northern part of the city.

Uniforms as Christmas Presents in Portland, Ore.—The Portland Railway, Light & Power Company, Portland, Ore., has announced that it will present all platform men who have been with the company five years or more, known as "gold stripe men," with Christmas gifts in the form of new uniforms, provided they apply for them within six months. There are about 300 men in the service of the company who are entitled to the new uniforms.

Complaint Against International Railway Closed.—The Public Service Commission of the Second District of New York has closed upon its records the complaint of H. H. Glosser and others against the International Railway, Buffalo, N. Y., as to service on the Cazenovia, Abbott Road and South Park lines, in Buffalo. The company has expressed its willingness to continue the present service on the Cazenovia line, and this is satisfactory to the complainants.

Transporting Policemen.—The Louisville & Southern Indiana Traction Company and the Louisville & Northern Railway & Lighting Company, Louisville, Ky., have announced that policemen will no longer be carried free on their lines outside the limits of the towns in which the companies operate. The franchises of the companies require that policemen be given free transportation within the municipal boundaries, but the companies have heretofore allowed policemen to ride anywhere on the lines.

Indiana Commission's Recommendations Observed.—The Ft. Wayne & Wabash Valley Traction Company has transferred its train dispatcher's office from the tower at the interlocking crossing at Bluffton, Ind., to Ft. Wayne, Ind., with authority over the running of trains between Ft. Wayne and Bluffton and Ft. Wayne and Peru. This change is in accordance with the recommendations of the Indiana Railroad Commission that train dispatchers should give their entire time to the movement of interurban trains, without attending to interlocking crossings. The dispatcher's office for the Peru-Lafayette division of the road will be removed from Huntington to Logansport.

Joint Rates in New York.—On Dec. 25, 1910, the Metropolitan Street Railway, New York, and the Central Park, North & East River Railroad established the joint rate for the transportation of passengers provided in the order of the Public Service Commission of the First District of New York as referred to in the Electric Railway Journal of Dec. 10, 1910, page 1171. The operation of the joint rate as explained to the public in the notices displayed in the cars follows: "Passengers on the avenue cars of the Metropolitan Street Railway may purchase from conductors, for the additional sum of 5 cents, upon request at the time cash fare is paid, a joint rate ticket, valid for fare on the cars of the Fifty-ninth Street Crosstown Line, with the privilege of continuing the journey northward or southward, according to the color of the ticket, on another intersecting line of the Metropolitan Street Railway system, as specified on Coupon 2 of the ticket."

Interurban Railway Replies to Complaint.—The Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y., has filed with the Public Service Commission of the Second District of New York its answer to the complaint of the residents of Galen, N. Y. The company states that if it is compelled to increase the number of stops the running time between Rochester and Syracuse will be increased materially. It now takes about 2 hours and 30 minutes to make the run between the cities, and if the time is increased the company will lose the patronage of a large number of persons who daily travel between the two terminals. The company's earnings are derived largely from the limited cars. A number of towns have recently been eliminated from the regular stops of limited cars, but the company claims that the service of these towns is adequate and much better than the service afforded by the steam railroads prior to the construction and operation of the electric railway.

New Schedule on Auburn & Syracuse Electric Railroad.—The Auburn & Syracuse Electric Railroad, Syracuse, N. Y., arranged to put a new schedule in effect on its line on Jan. 3, 1911. Under the new schedule there is a 40-minute instead of a 30-minute service on all days except Saturday, when a 30-minute service, differing from the present one, will be in force. A new feature of the schedule is a limited car service between Syracuse and Skaneateles at 5:20 p. m. every day except Saturday and Sunday. Under the new service the first car leaves Syracuse at 6:30 a. m., the next at 7:20 a. m., and thereafter every 40 minutes up to the last car at midnight. On Saturdays the first car leaves Syracuse at 6:30 a. m., the next at 7 a. m., the next at 8 a. m., and thereafter every 30 minutes until 11 p. m. The last car for Auburn leaves at 11:50 p. m. On the Saturday schedule the first car leaves Auburn at 5:40 a. m., the next at 6:40 a. m., and the next at 7 a. m., and thereafter every 30 minutes up to 9:30 p. m. The last two cars for Syracuse leave at 10:30 p. m. and 11:45 p. m.

Personal Mention.

Mr. D. H. McMichael has been appointed claim agent of the Fort Smith Light & Traction Company, Fort Smith, Ark., to succeed Mr. H. R. Bennett.

Mr. Arthur E. Tweedy has been elected president of the Danbury & Bethel Street Railroad, Danbury, Conn., to succeed the late Samuel C. Holley.

Mr. John Otto has been appointed purchasing agent of the Santa Barbara Consolidated Railroad, Santa Barbara, Cal., to succeed Mr. W. T. Sterling.

Mr. J. M. Thomas has been appointed chief engineer of the power station of the People's Traction Company, Galesburg, Ill., to succeed Mr. E. P. Shanks.

Mr. George L. Colgate has been appointed purchasing agent of the Ontario Light & Traction Company, Canandaigua, N. Y., to succeed Mr. J. B. Eaton.

Mr. Horace R. Hudson, treasurer of the Humboldt Transit Company, Eureka, Cal., has also been elected secretary of the company to succeed Mr. Burke Corbet.

Mr. D. J. McGuire has been appointed roadmaster of the Colorado Springs & Cripple Creek District Railway, Colorado Springs, Col., to succeed Mr. D. Dwyer.

Mr. C. D. Emmons, general manager of the Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind., has been elected president of the Railroad Young Men's Christian Association of Fort Wayne.

Mr. B. E. Tabler, formerly traffic agent of the Illinois Traction System at St. Louis, Mo., has been appointed freight and new business manager of the Choctaw Railway & Lighting Company, McAlester, Okla.

Mr. Walter W. Cook has been appointed master mechanic at the shops of the Terre Haute, Indianapolis & Eastern Traction Company at Greenfield, Ind. Mr. Cook was formerly connected with the Pullman Company.

Mr. J. B. Sucese, formerly superintendent of the Chicago, Indianapolis & Louisville Railway, Lafayette, Ind., has been appointed general superintendent of the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway, South Bend, Ind., effective Feb. 1, 1910, to succeed Mr. M. P. Reed, who will engage in business for himself at South Bend.

Mr. Ralph H. Rice has been appointed division engineer of electrical transmission and distribution, Board of Supervising Engineers, Chicago Traction, vice Mr. E. N. Lake, resigned. Mr. Rice was formerly assistant engineer of this division, having held that position since the organization of the Board of Supervising Engineers. Before becoming connected with the Board of Supervising Engineers Mr. Rice was one of the engineers of The Arnold Company, Chicago, Ill. Mr. W. F. Sims, formerly field engineer of the power department, has been appointed assistant division engineer to succeed Mr. Rice.

Mr. Peter E. Hurley, whose resignation as general manager of the Trenton (N. J.) Street Railway was announced in the ELECTRIC RAILWAY JOURNAL of Nov. 5, 1910, was tendered a reception on Dec. 30, 1910, at which all of the employees of the company were present. Mr. Hurley was presented with a gold watch by Mr. C. Howard Gibbs on behalf of the employees, who thanked Mr. Hurley for his courteous treatment of the men. Mr. Oscar T. Crosby, president of the Trenton & Mercer County Traction Company; Mr. Rankin Johnson, vice-president of the company; Mr. John T. Thompson, superintendent of the company, and Mr. Henry C. Moore, former president of the company, all made short addresses.

Mr. E. D. Smith resigned as superintendent of power stations of the United Railways, St. Louis, Mo., effective Jan. 1, 1911, to become chief engineer of the Board of Education of St. Louis. Mr. Smith was born in Galion, Ohio, on March 29, 1877. He was educated in the district schools of Missouri and at Missouri University, from which he was graduated in June, 1901, with the degree of electrical engineer. Immediately after he was graduated from college Mr. Smith entered the employ of the St. Louis Transit Company, the predecessor of the United Railways, as a helper in one of the electrical construction gangs. Subsequently he was employed in various capacities in the different power stations of the company and in the office of the superintendent of power of the company. In 1904 Mr. Smith was appointed superintendent of power stations of the company.

Mr. E. F. Schneider, secretary and general manager of the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, was tendered a dinner by the company on the evening of Dec. 28, 1910, at the conclusion of which the party adjourned to the directors' room, where Mr. A. E. Akins, first vice-president of the company, on behalf of the officers, presented Mr. Schneider with a traveling outfit. Among those present were: Mr. A. E. Akins, first vice-president of the company; Mr. J. O. Wilson, treasurer; Mr. H. B. Cavanaugh, auditor; Mr. J. A. Nestor, superintendent; Mr. W. E. Rolston, superintendent of power and shops; Mr. Ensign Johnson, superintendent; Mr. W. B. Demaline, superintendent of Ohio lines; Mr. G. F. Reidy, traveling passenger agent; Mr. G. McGraw, traveling auditor; Mr. C. G. Taylor, superintendent of lighting, and Mr. C. E. McKisson, claim adjuster.

Mr. W. H. Rushton has recently been appointed master mechanic of the Altoona & Logan Valley Electric Railway, Altoona, Pa., to succeed Mr. W. H. Dickson. Mr. Rushton began his railway career as an apprentice in the electrical department of the Hestonville, Mantua & Fairmont Railway, in 1896, after graduating from the Philadelphia High School. In 1897 Mr. Rushton was appointed foreman with the Union Traction Company, Philadelphia, Pa., and continued with this company and the Philadelphia Rapid Transit Company, its successor, until June, 1904. He then accepted a position as foreman with the Pacific Electric Company, Los Angeles, Cal., and continued with this company until June, 1905, when he contracted with J. G. White & Company, Inc., to act for five years as master mechanic of the Manila Railway & Light Company, Manila, P. I. Mr. Rushton returned to the United States in June, 1910.

Mr. B. R. Stephens, formerly general traffic manager of the Illinois Traction System, Champaign, Ill., has been appointed general superintendent of the Choctaw Railway & Lighting Company, McAlester, Okla. Mr. Stephens has had more than 20 years' experience with railroads. He began his career as a trainman and has at various times been connected with the Toledo, St. Louis & Western Railroad, Ohio Southern Railroad, Cleveland, Akron & Columbus Railroad, New York, Chicago & St. Louis Railroad and the Chicago & Eastern Illinois Railroad. He was connected with the Illinois Traction System for eight years. During the last four years of his connection with the Illinois Traction System Mr. Stephens acted as general traffic manager with headquarters in Springfield. Previous to serving the company in the capacity of traffic manager he was connected with the Indiana interests of the company for two years and served for two years at Champaign, Ill.

Mr. Samuel J. Dill, who has been assistant to the president of the Susquehanna Railway, Light & Power Company, New York, N. Y., has been elected vice-president of the company. Mr. Dill is also president of the United Service Company, which is purchasing agent of the Susquehanna Railway, Light & Power Company. This company controls a number of electric railway, light and power and gas properties in different cities. The principal railway properties are those in Elmira, N. Y., and Lancaster, Pa. Mr. Dill began his railway career with the Metropolitan Street Railway, New York, N. Y. He was promoted by the company to division foreman and was in charge of the Forty-second Street and Crosstown and the Boulevard lines when they were equipped with electricity. In 1901 he became superintendent of the Detroit, Ypsilanti, Ann Arbor & Jackson Railway, and later was appointed general superintendent in charge of the operation of the city lines in Kalamazoo and Battle Creek and the interurban railway connecting the two cities. In 1904 Mr. Dill was appointed general manager of the Youngstown & Southern Railway, and continued in that capacity until he was appointed resident general manager of the Elmira Water, Light & Railroad Company, Elmira, N. Y.

Mr. J. W. Smith has been appointed superintendent of railways of the Chattanooga Railway & Light Company, Chattanooga, Tenn., in charge of transportation, shops and car houses. Mr. Smith was graduated from Cornell University in 1893 as a mechanical and electrical engineer, and immediately after graduation was employed as one of the engineers in charge of converting the lines of the Union Traction Company, Philadelphia, Pa., from horse-power to electricity. After completing this work Mr. Smith took the ex-

pert course of the General Electric Company at Schenectady and Lynn, and in 1896 was one of the engineers on the construction of the system of the Fairmount Park Transportation Company, Philadelphia, Pa. Subsequently he was appointed manager of the Fairmount Park Transportation Company, and continued in that capacity until 1901. From 1901 until 1903 Mr. Smith was superintendent in charge of construction of the Augusta-Aiken Electric Railway, Augusta, Ga.; the Hampton Roads Railway & Electric Company, Newport News, Va., and the Jersey Central Traction Company, Keyport, N. J. From 1903 until February, 1907, Mr. Smith was general manager of the Schuylkill Railway, Girardville, Pa., and from February, 1907, until Dec. 1, 1910, he was general manager of the City Railway and the City & Elm Grove Railway, Wheeling, W. Va.

Mr. F. W. Bacon, whose resignation as general manager of the New Jersey & Hudson River Railway & Ferry Company, Edgewater, N. J., followed the purchase of the property of that company in October, 1910, by the Public Service Railway, had been connected with that company and its predecessors for the last 10 years. During this time the road grew from a small single-track suburban property of a few miles to an interurban system 45 miles in length operating 53 cars. Mr. Bacon, who is a brother of Mr. George W. Bacon, of Ford, Bacon & Davis, New York, N. Y., began his railway work in 1895 in the reconstruction of the Canal & Claiborne Railroad, New Orleans, La., where he was engaged in the general engineering department and later was placed in charge of the overhead line construction. Following this, he was engaged in the reconstruction of the New Orleans & Carrollton Railway, of which work he had charge, including the complicated construction on Canal Street. In 1896 these two companies were consolidated and Mr. Bacon served as traffic superintendent until 1900, when he became connected as general superintendent with the Bergen County Traction Company, of Edgewater, N. J. The Riverside & Fort Lee Ferry Company and the Hudson River Traction Company were added to the Bergen County Traction Company, the properties being afterward consolidated under the name of the New Jersey & Hudson Railway & Ferry Company. Mr. Bacon was appointed general manager of this property in 1905.

F. W. Bacon

OBITUARY

R. Winder Johnson, president of Lawrence Johnson & Company, who was also connected with the Abrasive Material Company, died suddenly at Jefferson Hospital, Philadelphia, Pa., on Dec. 27, 1910, from injuries which he had received a short time before.

Sir Charles Scotter, the chairman of the London & Southwestern Railway, London, England, is dead. Born at Hull, in 1835, he entered the service of the Manchester, Sheffield & Lincolnshire Railway, at the age of 18, as a clerk. In 1860 he was appointed passenger superintendent. Twelve years later he became assistant goods manager and goods manager in 1873, under Sir Edward Watkin, who was then chairman of the company; and again 12 years later he left the Manchester, Sheffield & Lincolnshire Railway to become general manager of the London & Southwestern Railway. This position also he held for more than 12 years. Subsequently he was elected director and became first deputy chairman and then, in 1904, chairman, in place of Lieutenant-Colonel H. W. Campbell. The Waterloo & City Railway was added to the Southwestern system through Sir Charles, who advocated the construction of a deep-level electric railway which should virtually prolong the Waterloo & City Railway to the Bank. Another line in which Sir Charles was interested was the Great Northern & City "tube" from Moorgate Street to Finsbury Park, London.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Shreveport & Memphis Railway Company, Shreveport, La.**—Incorporated in Louisiana to build an electric or steam railway to connect El Dorado, Homer and Minden, a distance of 45 miles. Later it is expected to extend this railway to Memphis. Surveys have been completed. Chicago capitalists are said to be backing the project. Incorporators: O. C. Ferguson and A. R. Johnson, Homer, La.

Northern Minnesota Railway, Virginia, Minn.—Incorporated to build an electric railway in Minnesota. Capital stock, $25,000. Incorporators: Edward Himes, Chicago; S. J. Gusson, Virginia; G. F. Lindsay, Davenport, Iowa; William O'Brien, St. Paul; H. C. Hornby, Cloquet.

Oklahoma-Kansas Railway, Joplin, Mo.—Incorporated in Missouri to build a 23-mile electric railway to connect Columbus, Galena and Baxter Springs, Kan., and Sunny Side, Lincolnville, Hattanville and Miami, Okla. This company was recently incorporated in Kansas as recorded in the Electric Railway Journal for March 12, '10. C. F Lambert, Kansas City, chief engineer. [E. R. J., July 16, '10.]

***Oklahoma Short Line Electric Railway, Shawnee, Okla.**—Incorporated in Oklahoma for the purpose of connecting the electric and interurban systems of Kansas, Missouri, Texas and Oklahoma. The main line will be 175 miles and will connect Oklahoma City and Joplin, Mo. A branch line of 125 miles will be built from Shawnee, Okla., to Denison, Tex. Construction will begin about Jan. 20. It is the intention to build from Shawnee to Muskogee and Oklahoma City first. It is expected to lay 90-lb. steel and to construct the railway for hauling freight, passengers and mail. Options and right-of-way have been secured through all the counties through which the lines will pass. The power plant and car shops will be located east of Shawnee. Capital stock, $100,000. Incorporators: C. C. Wright, Ada; M. J. Bentley, Tecumseh; Peroy Paddock, Oklahoma City; Z. V. Sanders, Albermarle; S. C. and Thomas E. Armentrout, Kirkwood, Mo.

FRANCHISES

Montgomery, Ala.—The Montgomery Traction Company has asked the City Council for a franchise to build several extensions to its railway in Montgomery.

***Phoenix, Ariz.**—Selim Michelson, Phoenix, has asked the Board of Supervisors for a franchise to build an electric railway over Center Street bridge in Phoenix to Tempe and Mesa. Dr. H. H. Stone and Charles Goldman have asked for a franchise to build an electric railway from Phoenix to Mesa.

Nanaimo, B. C.—A by-law is being prepared authorizing the Nanaimo Electric Railway to build its railway over certain streets in Nanaimo, B. C.

San Jose, Cal.—The San Jose & Santa Clara County Railroad, San Jose, has asked the Common Council for switch and turn privileges and the use of T-rails in Santa Clara Street. In return the company will lower its tracks and pave streets at once in San Jose.

Danbury, Conn.—The Danbury & Bethel Street Railway will ask the General Assembly for a franchise to extend its lines from the present terminus of its lake division on Kenosia Avenue, Danbury, to the New York State line. Plans are also being considered to extend this railway between Danbury and Brewster.

Waterbury, Conn.—The Waterbury & Milldale Tramway, Waterbury, has asked the General Assembly for an extension of time to its franchise in which to build its proposed 9-mile electric railway from Milldale to Waterbury over Wolcott Mountain. The company wants the time limit for building the railway extended to July 1, 1915. John H. Cassidy, Waterbury, secretary. [E. R. J., Aug. 13, '10.]

***Oak Park, Ill.**—D. O. Ward has asked the Village Board for a franchise to build an electric railway from Harrison

Street on the south to Chicago Avenue on the north in Oak Park.

Pekin, Ill.—The Pekin & Petersburg Interurban Railway has received a franchise from the City Council to build an electric railway through Pekin. This projected line will connect Pekin and Petersburg. J. E. Melick is interested. [E. R. J., Dec. 10, '10.]

***South Bend, Ind.**—P. E. Hall, representing the South Bend Electric Company, has asked the City Council for a franchise to build an electric railway in South Bend. Jay D. Crary has also asked the City Council for a similar franchise.

Waltham, Mass.—The Boston & Western Electric Railway will file a petition with the Railroad Commissioners asking for a location for tracks in Marlboro, Waltham, Weston, Wayland and Sudbury. [E. R. J., Oct. 1, 1910.]

Worcester, Mass.—The Worcester Consolidated Street Railway has accepted three franchises for short extensions in Worcester.

***Eveleth, Minn.**—The Range Electric Railroad has asked the City Council for a franchise to build its railway through Eveleth.

Virginia, Minn.—The Great Northern Power Company, Duluth, will ask the City Council for a franchise to build an electric railway through Virginia. This proposed 40-mile railway will connect Hibbing, Chisholm, Buhl, Kinney and Gilbert, with a probable extension to Stevenson and Kewatin on the west to Elb, McKinley and Biwabik on the east. [E. R. J., Dec. 10, '10.]

***St. Louis, Mo.**—Benjamin Westhus and associates will ask the City Council for a franchise to build an elevated railway connecting the central business district of St. Louis with South Broadway, and extending to Southampton and the southwestern city limits.

Lambertville, N. J.—The New Jersey & Pennsylvania Traction Company, Trenton, has received a franchise from the City Council to construct a track on Lambert Street in Lambertville to be used for freight purposes.

Corning, N. Y.—The Elmira, Corning & Waverly Railroad, Elmira, has received a franchise from the Town Board to cross the highways of the town at convenient points and also to occupy with its double tracks the new Corning-Caton road at Brown's Crossing. In return the company will provide a subway under the Erie Railroad tracks.

Wilson, N. Y.—The Wilson Railway has asked the City Council for a franchise to build a 2-mile electric railway over certain streets in Wilson. It will connect the railroad station in Wilson with Island Lake Park and Sunset Beach on Lake Ontario. S. M. Conant, Wilson, president. [E. R. J., Oct. 15, '10.]

Memphis, Tenn.—The Clarksdale, Covington & Collierville Interurban Railway has received and accepted the franchise from the City Council to build a railway over certain streets in Memphis.

Seattle, Wash.—The Seattle Electric Company has received a franchise from the City Council to build an electric railway over certain streets in Seattle.

***Tomahawk, Wis.**—John Oelhafier, Andrew Oelhafier, Robert Thielman and W. G. Foss have asked the City Council for a franchise to build an electric railway in Tomahawk.

TRACK AND ROADWAY

Calgary (Alta.) Municipal Railway.—This company has decided to extend its railway in Calgary in the spring.

Northern Electric Railway, Chico, Cal.—This company will build an extension of its railway from Del Paso station in Oroville to Fair Oaks and Orangeville during 1911.

Los Angeles-Pacific Railway, Los Angeles, Cal.—This company has awarded to Palmer, McBride & Quayle Company, Pacific Electric Building, Los Angeles, the contract for the construction of a 10-mile extension of its railway from Hollywood to Lankershine and Kester.

***Monrovia, Cal.**—J. M. Holmes, San Diego, and W. R. Stoats, Pasadena, are said to be arranging to build a proposed electric railway to the summit of Mount Wilson.

Chicago, Terre Haute & Southeastern Railway, Chicago, Ill.—This company reports that this proposed railway will be operated by steam and not by electricity. [E. R. J., Dec. 24, '10.]

Sterling-Moline Traction Company, Sterling, Ill.—The contract awarded the Northwestern Engineering & Construction Company, Milwaukee, has been ratified by the directors of this company and work will begin in the spring on this proposed electric railway to connect Sterling, Morrison, Lynedon, Prophetstown, Erie, Hillsdale and Moline. A. Van Petten, Sterling, general manager. [E. R. J., Nov. 26, '10.]

Evansville (Ind.) Railways.—Plans are being made by this company to build a 15-mile extension of its railway from Mount Vernon to New Harmony. The company has completed and placed in operation a 6½-mile extension from Rockport to Grandview.

***Evansville, Ind.**—J. A. Brown, who is building a new industrial town on the Kentucky side of the Ohio River, opposite Evansville, Ind., to be known as "Mortalies," will build a traction line to connect with Evansville, according to statements credited to him. Cars will be transferred over the river by ferry and work on the construction of the line will begin Feb. 1, 1911.

Kendallville, Ligonier & Goshen Traction Company, Kendallville, Ind.—J. M. Kinney is said to be interested in a plan to build an electric railway to connect Kendallville, Brimfield, Wawaka, Ligonier, Millersburg, Benton and Goshen. [E. R. J., Oct. 3, '08.]

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—This company has completed and placed in operation its 8-mile extension from Denver Junction to Waverly. The line will be extended from Cedar Falls to Dike in the spring.

***Paducah, Ky.**—S. A. Fowler, secretary of the Commercial Club, Paducah, states that New York promoters have purchased the right-of-way for an electric railway between Wickliffe and Fulton, and it will likely be extended to Paducah.

***Cumberland, Md.**—It is said that engineers are at work on a survey between Meyersdale, Pa., and Frostburg, Md., for a proposed electric railway between the Cumberland & Westernport Electric Railway, Cumberland, and the Pennsylvania & Maryland lines operating through the Meyersdale field. The intention of the promoters is to connect Johnstown, Pa., and Cumberland, Md.

***Columbia Falls, Mont.**—James A. Talbott, Butte, and associates are planning to build an electric railway to extend from Columbia Falls to Polson. Work is scheduled to begin by March. A company is being formed, and will probably file articles of incorporation soon.

Forty-second, Manhattanville & St. Nicholas Avenue Railway, New York, N. Y.—This company has applied to the Public Service Commission for approval of a change of motive power on its 110th Street line. The company proposes to operate storage battery cars.

Syracuse & South Bay Electric Railroad, Syracuse, N. Y.—This company is making surveys for an extension from Syracuse to Watertown via Brewerton, Central Square, Mallory, Hastings, Lacona and Adams, a distance of about 73 miles.

North Carolina Traction Company, Danbury, N. C.—At a recent meeting of the incorporators of this company it was decided to award contracts for construction work during January for building a proposed 92-mile electric railway from Winston-Salem, N. C., to Floyd, Va. Twenty miles of this railway are now ready for ties and rails. The First National Bank of Lumberton and H. M. McAlister will be trustees of the $2,000,000 bond issue authorized by the board of directors. The company was formally organized Dec. 28, '10, by the election of the following officers: A. M. Clark, Southern Pines, president; J. W. Sykes, Raleigh, vice-president; E. L. Kraft, Indianapolis, general manager; H. P. McKnight, general director; T. F. Walker, Cincinnati, secretary; J. W. Kraft, Indianapolis, purchasing agent, and H. M. McAlister, Lumberton, N. C., treasurer. [E. R. J., Sept. 10, '10.]

***Fort Ransom, N. D.**—Plans are being considered to organize a company to build an electric railway to connect Fort Ransom and Enderlin.

***Miami Transit, Light & Power Company, Lebanon,**

Ohio.—This company advises that negotiations are now pending which promise to result in the completion of this proposed railway in the near future. Further information will be given later. Charles A. Hough, president.

Fostoria-Fremont Railway, Lima, Ohio.—This company has completed eight miles of track on the line which will connect the Western Ohio Railway with the Lake Shore Electric Railway at Fremont. The company expects to complete the work in January and to inaugurate limited service between Cleveland and Dayton by April 1. [E. R. J., Oct. 8, '10.]

Muskogee (Okla.) Electric Traction Company.—This company expects to begin work this month on its northern extension of its railway from Fond du Lac Street and Fourth Street in Muskogee to the factory addition. The fair ground extension will also be extended as far as the Midland Valley addition and the car shops.

Baker Interurban Railway, Baker City, Ore.—Anthony Mohr, promoter of this company, states that work will begin early in the spring on this proposed 100-mile electric railway to connect Baker City, North Powder and Eagle Valley. [E. R. J., June 25, '10.]

Farmers' Electric Railway, Vale, Ore.—Surveys have been completed by this company for its proposed 16-mile electric railway to connect Vale and Malheur Canyon. It is expected to extend this line to Ontario, Ore. G. W. Thomas, Ontario, Ore., president. [E. R. J., Dec. 17, '10.]

Lehigh Valley Transit Company, Allentown, Pa.—This company will soon begin to extend its line from Slatington to Lehigh Gap and Palmerton and connect with the Carbon Transit Company at Lehighton. This will provide a direct line from Pottsville to Philadelphia via Mauch Chunk.

Lewisburg, Milton & Watsonville Passenger Railway, Milton, Pa.—Plans for building an extension from Watsontown to Montgomery and eventually to Muncy and Montoursville, connecting Sunbury and Williamsport, are being considered by this company. It is negotiating with the commissioners of Northumberland and Union counties with a view of strengthening the Allenwood bridge to be used by its electric railway.

***Philadelphia, Pa.**—I. T. Silverman, Philadelphia, is said to be promoting plans for building a proposed electric railway from Eddystone between the Philadelphia & Reading Railway and the Philadelphia Railroads as far as the old rifle range in Tinicum, from which point it will branch across the marsh lands to West Philadelphia.

Chambersburg, Greencastle & Waynesboro Electric Railway, Waynesboro, Pa.—This company is making considerable progress in the grading for its extension from Pen Mar to Blue Ridge Summit. It is expected to be ready for track laying by Feb. 1.

Montreal (Que.) Street Railway.—This company is ready to begin the construction of a belt line underground railway as soon as the corporation of the city will give them the necessary legislation. The general scheme for the tunnel is to cut through under Côte des Neiges Hill, starting in with the entrance near Guy and Sherbrooke streets and coming out near Shakespeare Road, making a total underground distance of some 5500 ft. Three tunnels have been suggested on this route, a double-track one in the middle for rapid transit service and a wide one on either side, about 30 ft., for vehicular traffic going in alternate directions.

***Franklin, Tenn.**—It is reported that plans are being made to build a proposed electric railway from Franklin to Shelbyville via Fayetteville.

Tennessee Traction Company, Memphis, Tenn.—It is said that this company is planning to begin construction soon on its proposed 210-mile electric railway to connect Memphis, Nashville and Jackson. George E. Busnell, Memphis, general manager. [E. R. J., July 30, '10.]

Tennessee Rapid Transit Company, Nashville, Tenn.—This company announces that work will begin at once on its proposed 110-mile electric railway to connect Nashville, Lewisburg, Clarksville and Springfield. It has secured financial backing. J. M. Gray, Franklin, is interested. [E. R. J., Dec. 17, '10.]

Mount Adams Railway, White Salmon, Wash.—This company will begin work in the spring on its proposed 40-mile electric railway to connect White Salmon, Bingen, Bristol, Pine Flat, Snowden, Timber Valley and Glenwood. It has recently elected the following officers: W. W. Swan, president; T. Wyers, vice-president; T. F. Shepler, secretary, and R. Field, treasurer, all of White Salmon. [E. R. J., July 30, '10.]

***Montgomery, W. Va.**—M. J. Simms, Montgomery, is making arrangements for closing contracts preparatory to the construction of a 3½-mile railway to connect Montgomery and Boomer, via Harewood and Lonacre. An entrance will be made into Montgomery over a new bridge recently completed and equipped for rail and team traffic.

SHOPS AND BUILDINGS

Southern Pacific Railroad, Los Angeles, Cal.—This company is considering plans for building new car shops at Tucson, Ariz. It is said that work will begin in the spring.

Alton, Granite & St. Louis Traction Company, Alton, Ill.—It is reported that this company will soon build a new car house at Granite City. The cost is estimated to be about $25,000. O. C. Macy, Alton, superintendent.

Illinois Traction Company System, Champaign, Ill.—This company has just opened a new station at Sawyerville.

Otsego & Herkimer Railroad, Hartwick, N. Y.—This company's car house at Oneonta was recently destroyed by fire.

Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind.—C. D. Emmons, general manager of this company, announces that satisfactory progress is being made in arranging for the construction of a joint station by the four traction lines centering in Bluffton.

Metropolitan Street Railway, Kansas City, Mo.—This company has completed plans for erecting a new office building to occupy the northeast corner of Eleventh Street and Main Street in Kansas City.

Galveston-Houston Electric Railway, Houston, Tex.—This company announces that plans and specifications for its new car houses to be built at Broadway and Fifty-first Street in Galveston are ready to be placed in the hands of bidders. Construction will begin as soon as the contract is awarded. The structure is to be built of concrete and steel, and all modern equipment will be installed.

POWER HOUSES AND SUBSTATIONS

San Diego (Cal.) Electric Railway.—This company has awarded to Charles W. Carbaley, Wilcox Building, Los Angeles, the contract for the construction of an intake for its new power plant at San Diego to consist of two 5-ft. conduits leading from the bay at the foot of E Street to the power house, which will be located at Arctic Street and E Street.

Augusta-Aiken Railway & Electric Company, Augusta, Ga.—This company has purchased from the General Electric Company one 2750-kw turbo generator with station equipment; one 500-kw motor generator set with step-down transformers and one 300-kw motor generator set with step-down transformers.

Metropolitan Street Railway, Kansas City, Mo.—This company has begun the construction of its two-story fireproof building at Thirteenth Street and Baltimore Avenue in Kansas City. The foundations and floors of the structure will be of reinforced concrete and the superstructure will be of brick. It will house two engines to be moved in from the Blue River power house. The cost is estimated to be about $45,000.

Oklahoma Short Line Electric Railway, Shawnee, Okla.—It is said that this company will build a power plant east of Shawnee.

Whatcom County Railway & Light Company, Bellingham, Wash.—This company has completed and placed in operation its new power station on Railroad Avenue and York Street in Bellingham. This station will increase the capacity of the company's power supply by about 3300 hp.

Sheboygan Light, Power & Railway Company, Sheboygan, Wis.—This company has just installed in its power house a 350-hp boiler, equipped with an automatic stoker.

Manufactures & Supplies

ROLLING STOCK

Scranton (Pa.) Railway will purchase 10 double-truck cars early in 1911.

Savannah (Ga.) Electric Company, it is reported, will purchase a number of double-truck, semi-convertible cars.

Augusta-Aiken Railway & Electric Company, Augusta, Ga., has purchased five quadruple General Electric motor equipments.

Scranton & Binghamton Traction Company, Scranton, Pa., it is reported, will purchase immediately six 45-ft. passenger cars.

Indianapolis, Columbus & Southern Traction Company, Columbus, Ind., will order three passenger cars and two freight cars.

Rochester & Manitou Railroad, Charlotte, N. Y., will purchase three standard semi-convertible, double-truck passenger cars.

Holmesburg, Frankford & Tacony Electric Railway, Tacony, Pa., will purchase two prepayment, semi-convertible, double-truck cars.

Norfolk & Portsmouth Traction Company, Norfolk, Va., is in the market for eight pay-as-you-enter cars, to be delivered next spring.

Omaha & Council Bluffs Railway, Omaha, Neb., has purchased from the Browning Engineering Company, Cleveland, O., one electric locomotive crane.

Hoboken (N. J.) Manufacturers' Railroad has purchased, through W. J. Wilgus, one 80-ton electric locomotive, from the General Electric Company, Schenectady, N. Y.

TRADE NOTES

Railway Track-Work Company, Philadelphia, Pa., recently organized, has taken over the business of rail grinding formerly conducted by William D. Gherky.

National Brake & Electric Company, Milwaukee, Wis., has received an order from the Westchester Street Railway, White Plains, N. Y., to equip 20 cars with air brakes.

Ackley Brake Company, New York, N. Y., has received an order through R. W. Cameron & Company for 50 Ackley adjustable brakes for the Adelaide (Australia) Tramways.

Thomas F. Fournier has resigned his position with the Taunton & Pawtucket Street Railway, Taunton, Mass., to accept a position as consulting engineer with the United Traction Improvement Company.

William Stevenson, who for five years has been designing engineer for the McGuire-Cummings Manufacturing Company, Chicago, Ill., has been appointed special representative of the Indian Refining Company, Inc., Cincinnati, Ohio.

Root Spring Scraper Company, Kalamazoo, Mich., has received an order from the Boston Elevated Railway for 100 scrapers for its 50 new cars. This company has also received an order from the Michigan United Railways, Lansing, Mich., for 2 four-wheel scrapers.

Murphy Iron Works, Detroit, Mich., will open an office in the Empire Building, Atlanta, Ga., in charge of Roland B. Hall, Jr., who will handle this business in connection with that of the Harrisburg Foundry & Machine Works, which he has represented in the southern territory for some time.

McKeen Motor Car Company, Omaha, Neb., has shipped one 55-ft. 200-hp steel gasoline motor car to the Charles City (Ia.) Western Railway, under its own power. This company has also shipped to the Arizona Eastern Railroad, Globe, Ariz., a 70-ft. steel gasoline motor car under its own power.

Curtain Supply Company, Chicago, Ill., has received an order from the Third Avenue Railroad, New York, N. Y., to furnish curtains with No. 089 protected groove ring fixtures and Rex rollers for 100 cars. This company has also received an order from the Philadelphia Rapid Transit Company to furnish curtains with No. 48 ring fixtures and Rex rollers for 15 cars.

N. W. Harris & Company, New York, N. Y., bankers and brokers, changed their name on Jan. 1 to Harris, Forbes & Company. The firm membership remains the same. Allen B. Forbes, whose name will appear with that of Mr. Harris in the firm's title, has been associated with N. W. Harris & Company in an important capacity for 20 years, and has been the managing partner of the New York office for the last decade. The other partners resident in New York are Arthur M. Harris, Lloyd W. Smith, Everett B. Sweezy and Charles W. Beall.

H. M. Byllesby & Company, Chicago, Ill., have acquired control of a number of additional public utility properties in California, which include the Stockton Gas & Electric Corporation, the Richmond Gas & Electric Company, the American River Electric Company, which includes service by long-distance transmission lines to the towns of Stockton, Placerville, Florin, Elk Grove, Sheldon, Gault, Lodi and Plymouth, and the Humboldt Electric Company, which includes service to the towns of Arcata, Alton, Ferndale, Fields Landing, Fortune, Hydesville, Loleta and Rohnersville.

Ohmer Fare Register Company, Dayton, Ohio, gave its annual dinner to local employees of the company at the Phillips House, in Dayton, on the evening of Dec. 28, 1910, One hundred dollars in prizes were distributed to 17 employees for valuable suggestions made for the betterment of the various types of Ohmer registers. Speeches were made by president of the company, John F. Ohmer; E. Frank Brewster, vice-president, and J. H. Stedman, secretary. Addresses were also made by Superintendent W. J. Kuhns and by F. G. Colby, E. H. Bridenbaugh, Harry Nelson, C. V. Funk, the heads of various departments. E. B. Grimes, assistant general manager of the company, was the toastmaster of the evening. The music was furnished by the Ohmer Fare Register Company Band, consisting of 20 pieces.

ADVERTISING LITERATURE

Ingersoll-Rand Company, New York, N. Y., has issued form No. 4202, illustrating and describing "Sergeant" rock drills.

General Vehicle Company, Long Island City, N. Y., has issued a catalog describing and illustrating electric commercial vehicles.

Trussed Concrete Steel Company, Detroit, Mich., has issued a very attractive catalog illustrating and describing the united steel sash.

Colorado Portland Cement Company, Denver, Colo., has issued a catalog describing the alkali-proof Portland cement which it manufactures.

Heywood Brothers & Wakefield Company, Wakefield, Mass., has issued a very attractive catalog, illustrating and describing several different styles of Universal car seats.

McGraw-Hill Book Company, New York, N. Y., has recently issued two catalogs, one describing new and standard books on civil engineering, the other describing books on iron and steel.

Whipple Supply Company, New York, N. Y., is issuing a very attractive folder describing the Hedley anti-telescoping and anti-climbing device. A number of illustrations are also contained in this folder, showing the effects of collisions between cars equipped with this device.

Chicago Bearing Metal Company, Chicago, Ill., has issued the *Graphose Age,* dated December, 1910. This publication is distributed occasionally by the company to call attention to its products, among which are brass castings for steam and street railways and general machinery.

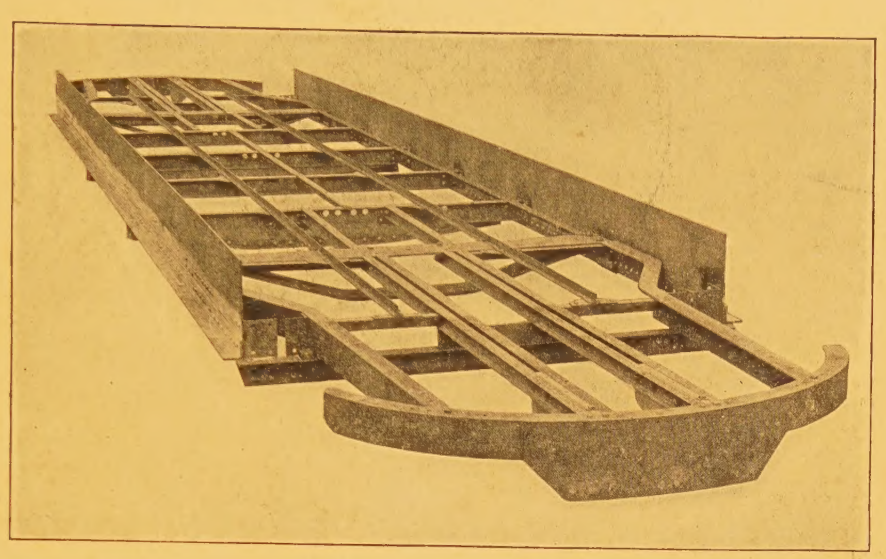
Joseph Dixon Crucible Company, Jersey City, N. J., has published the January, 1911, number of "Graphite." In this issue is a short article by John M. Turner, United States commercial agent, on the "Slowness of the United States," and another on "Creative Salesmanship," by E. St. Elmo Lewis, advertising manager of the Burroughs Adding Machine Company.

Goldschmidt Thermit Company, New York, N. Y., publishes in "Reactions," for the last quarter of 1910, the following articles: "Rail Welding in Many Countries," "Rail Welding in Holyoke, Mass.," "Making Semi-Steel by the Thermit Process," "Further Applications of Thermit in Ship Repairs," "The Cruiser Dixie," "Thermit for Locomotive Repairs," "Welding Two Side Rods at One Operation," and "Waterwheel Welded in 1907 Still in Operation."

TABLE OF MONTHLY EARNINGS.

Notice—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The tal should be used in connection with our Financial Supplement, "American Street Railway Investments," which contains the annual operating reports to the ends of t various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. *Including taxes. †Deficit.

Company	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Nov.'10	$189,705	$110,718	$78,987	$43,367	$35,620
	1 " " '09	175,743	99,973	75,770	43,400	32,370
	11 " " '10	2,235,453	1,233,947	1,001,506	476,894	524,612
	11 " " '09	1,994,729	1,088,502	906,227	480,856	425,371
BANGOR, ME. Bangor Ry. & Elec. Co.	1m., Nov.'10	46,346	18,587	27,759	13,222	13,831
	1 " " '09	45,427	18,336	27,091	12,273	14,082
	11 " " '10	282,817	106,125	156,692	68,574	88,118
	11 " " '09	275,477	103,228	152,249	65,429	86,820
BELLINGHAM, WASH. Whatcom Co. Ry. & Lt. Co.	1m., Oct. '10	37,695	18,142	19,554	9,229	10,325
	1 " " '09	35,672	19,608	16,064	8,469	7,595
	12 " " '10	430,020	239,237	190,782	104,976	85,807
	12 " " '09	401,186	225,640	175,546	100 468	75,078
CHAMPAIGN, ILL. Illinois Tr. System	1m., Oct. '10	614,476	*338,360	276,115	.....	.....
	1 " " '09	509,171	*265,145	244,026	.....	.....
	10 " " '10	5,018,865	*2,966,046	2,052,819	.....	.....
	10 " " '09	4,379,325	*2,520,562	1,858,763	.....	.....
CHATTANOOGA, TENN. Chattanooga Ry. & Lt. Co.	1m., Oct. '10	77,993	37 591	40,402	23,700	16,702
	1 " " '09	67,570	38 372	29,198	22,218	6,980
	10 " " '10	728,940	371,110	357,830	234,601	123,229
	10 " " '09	642,355	372,844	269,511	215,281	54,230
CHICAGO, ILL. Aurora, Elgin & Chicago R.R.	1m., Nov.'10	132,508	74,422	58,086	34,603	23,483
	1 " " '09	122,789	69,526	53,263	29,586	23 677
	5 " " '10	809,583	418,471	391,112	167,044	224,069
	5 " " '09	740,805	372,108	368.696	146,663	222,034
CLEVELAND, O. Cleveland, Painesville & Eastern R.R.	1m., Nov.'10	27,037	*15,112	11,925	7,947	3,997
	1 " " '09	25,900	*15,950	9,951	7,528	2,423
	11 " " '10	328,235	*170,555	157,681	88,638	69,043
	11 " " '09	297,573	*161,380	136,193	82,956	53,237
Lake Shore Electric Ry.	1m., Nov.'10	91,802	*50,792	41,010	34,669	6,341
	1 " " '09	90,705	*48,984	41,721	35,393	6,328
	11 " " '10	1,110,541	*579,893	530,648	382,347	148,301
	11 " " '09	1,020,022	*538,429	481,592	379,939	101,653
DALLAS, TEX. Dallas Electric Corporation.	1m., Oct. '10	165,372	89,152	76,219	23,748	52,471
	1 " " '09	147,838	80,397	67,441	27,471	39,970
	12 " " '10	1,443,966	943,991	499,975	316,410	183,565
	12 " " '09	1,291,164	809,900	481,264	338,780	142,484
DETROIT, MICH. Detroit United Ry.	1m., Nov.'10	754,924	478,304	276,620	174,312	102,308
	1 " " '09	687,093	440,750	246,343	157,919	88,424
	11 " " '10	8,718,014	5,486,787	3,231,227	1,863,862	1,367,365
	11 " " '09	7,483,524	4,614,783	2,868,741	1,723,399	1,145,342
EAST ST. LOUIS, ILL. East St. Louis & Suburban Co.	1m., Oct. '10	209,592	105,767	103,826	.....	.....
	1 " " '09	191,775	93,206	98,569	.....	.....
	10 " " '10	1,966,354	1,032,518	933,836	.....	.....
	10 " " '09	1,672,853	911,212	761,641	.....	.....
EL PASO, TEX. El Paso Elec. Co.	1m., Oct. '10	55,172	32,919	22,253	8,224	14,029
	1 " " '09	58,347	35,712	22,653	8.421	14,215
	12 " " '10	631,241	362,528	268,713	101,090	167,623
	12 " " '09	588,012	368,245	219,767	95,691	124,076
FT. SMITH, ARK. Ft. Smith Lt. & Trac. Co.	1m., Oct. '10	38,022	20,565	17,457	.....	.....
	1 " " '09	32,302	17,550	14,752	.....	.....
	6 " " '10	210,137	121,317	88,820	.....	.....
	6 " " '09	181,100	101,978	79,122	.....	.....
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Trac. Co.	1m., Oct. '10	131,360	67,366	63,994	45,829	18,165
	1 " " '09	122,805	70,386	52,420	42,285	10,135
	10 " " '10	1,266,085	706,280	559,806	451,383	108,423
	10 " " '09	1,161,156	678,925	482,231	423,729	58,501
FT. WORTH, TEX. Northern Texas Electric Co.	1m., Oct. '10	154,007	71,123	82,884	20,290	62,594
	1 " " '09	1,350 697	64,595	71,102	16,190	54,913
	12 " " '10	1,409,311	753,871	655,440	228,011	427,429
	12 " " '09	1,236,545	684,563	551,982	200,973	351,009
GALVESTON, TEX. Galveston-Houston Elec. Co.	1m., Oct. '10	113,476	65,937	47,539	25.565	21,974
	1 " " '09	102,014	64,652	37,362	22,486	14,877
	12 " " '10	1,289,537	777,563	511,975	284,599	227,376
	12 " " '09	1,189,064	703,830	494,234	259,492	234,743
GRAND RAPIDS, MICH. Commonwealth Pwr., Ry. & Lt. Co.	1m., Oct. '10	425,742	224,373	201,369	122,033	79,366
	1 " " '09	389,368	202,296	187,072	118,735	68,377
	10 " " '10	4,081,714	2,104,066	1,977,648	1,231,698	745,950
	10 " " '09	4,560,631	1,829,016	1,731,615	1,183,301	548,314
Grand Rapids Ry.	1m., Nov.'10	88,376	46,365	42,011	19,475	22,536
	1 " " '09	80,327	43,201	37,126	18,590	18,536
	11 " " '10	1,036,304	508,292	528,012	218,406	309,606
	11 " " '09	938,868	447,670	491,198	208,676	282,522
HOUGHTON, MICH. Houghton Co. Trac. Co.	1m., Oct. '10	26,192	12,819	13,373	6,637	6,736
	1 " " '09	26,543	13,070	13,473	6,215	7,258
	12 " " '10	314,642	166,160	148,481	77,821	70,660
	12 " " '09	315,393	170,131	145,262	71,645	73,617
JACKSONVILLE, FLA. Jacksonville Elec. Co.	1m., Oct. '10	48,367	27,088	21,279	9,346	11,933
	1 " " '09	41,567	22,136	19,430	9,452	9,978
	12 " " '10	566,403	302,028	264,375	112,295	152,080
	12 " " '09	468,002	265,784	202,219	112,187	90,032
KANSAS CITY, MO. Kansas City Ry. & Lt. Co.	1m., Nov.'10	644,416	381,402	263,015	188,643	74,35
	1 " " '09	607,167	352,219	254,948	171,429	83,57
	6 " " '10	3,829,206	2,283,496	1,545,710	1,132,175	413,51
	6 " " '09	3,551,648	2,018,634	1,533,014	1,037,060	495,98
LEWISTON, ME. Lewiston, Augusta & Waterville St. Ry.	1m., Nov.'10	37,580	25,143	12,437	13,703	†1,27
	1 " " '09	35,985	23,208	12,777	15,093	†2,31
	11 " " '10	255,291	141,911	113,380	68,679	44,70
	11 " " '09	256,671	133,320	123,351	74,405	48,94
MILWAUKEE, WIS. Milwaukee Elec. Ry. & Lt. Co.	1m., Nov.'10	413,201	283,391	129,810	47,244	82,56
	1 " " '09	383,156	252,839	130,317	48,561	81,75
	11 " " '10	4,329,236	3,024,328	1,304,908	516.217	788,69
	11 " " '09	3,919,653	2,572,758	1,346,8[illegible]	520,318	826,58
Milwaukee Lt., Ht. & Trac. Co.	1m., Nov.'10	125,088	50,101	74,987	55,383	19,60
	1 " " '09	118,001	45,039	72,962	53,044	19,91
	11 " " '10	1,487,170	593,915	893,255	608.250	285,00
	11 " " '09	1,353,010	503,191	849,819	566,030	283,78
MINNEAPOLIS, MINN. Twin City Rapid Transit Co.	1m., Oct. '10	645,358	308,743	336,616	140,321	196,29
	1 " " '09	596,963	277,175	319,788	140.251	179,53
	10 " " '10	6,265,727	2,996,849	3,268,877	1,401,974	1,866,90
	10 " " '09	5,773,383	2,709,742	3,063,645	1,388,761	1,674,87
MONTREAL, QUE. Montreal St. Ry.	1m., Nov.'10	366,098	227,442	138,656	32,013	106,64
	1 " " '09	334,871	200,138	134,734	30,785	103,94
	2 " " '10	752,786	433,192	319,594	64,011	255,58
	2 " " '09	688,878	374,873	314,006	61,864	252,14
NASHVILLE, TENN. Nashville Ry. & Lt. Co.	1m., Nov.'10	158,739	85,847	72,892	33,390	39,50
	1 " " '09	149,426	83,181	66.245	33,023	33,22
	11 " " '10	1,662,093	959,077	703,016	369,036	333,98
	11 " " '09	1,565,102	919,503	645,599	361,330	284,26
OTTUMWA, IA. Ottumwa Ry. & Lt. Co.	1m., Oct. '10	22,257	11,934	10,323	.....	.....
	1 " " '09	20,003	12,543	9,460	.....	.....
	6 " " '10	123,113	66,650	56,463	.....	.....
	6 " " '09	111,207	59,683	51,524	.....	.....
PADUCAH, KY. Paducah Trac. & Lt. Co.	1m., Oct. '10	20,949	11,747	9,202	7,169	2,03
	1 " " '09	18,924	11,764	7,160	6,625	53
	12 " " '10	245,521	144,283	101,238	83,921	17,31
	12 " " '09	225,608	132,238	93,370	81,726	11,64
PENSACOLA, FLA. Pensacola Elec. Co.	1m., Oct. '10	23,650	13,578	10,072	5,106	4,96
	1 " " '09	21,027	12,379	8,648	4,474	4,17
	12 " " '10	264,701	155,488	109,214	59,452	49,76
	12 " " '09	242,539	139,127	103,412	52,077	51,33
PHILADELPHIA, PA. American Rys. Co.	1m., Nov.'10	307,376	.....	.....	.....	.....
	1 " " '09	296,087	.....	.....	.....	.....
	5 " " '10	1,743,688	.....	.....	.....	.....
	5 " " '09	1,626,519	.....	.....	.....	.....
PLYMOUTH, MASS. Brockton & Plymouth St. Ry.	1m., Oct. '10	9,797	7,337	2,461	1,578	88
	1 " " '09	10 253	7,592	2,661	1,756	90
	12 " " '10	120,557	84,930	35,626	20,579	15,04
	12 " " '09	130,450	92,311	38,139	22,375	15,76
PORTLAND, ORE. Portland Ry., Lt. & Pwr. Co.	1m., Nov.'10	498,953	222,581	276,372	151,217	125,15
	1 " " '09	411,001	174,270	236,731	125,019	111,71
	11 " " '10	5,108,927	2,214,968	2,893,959	1,550,411	1,343,54
	11 " " '09	4,385,356	2,014,219	2,371,137	1,363,227	1,007,91
ROCKFORD, ILL. Union Ry., Gas & Elec. Co.	1m., Oct. '10	284,293	139,652	144,641	66,845	77,79
	1 " " '09	266,263	136,286	129,977	52,739	77,23
	10 " " '10	2,421,889	1,336,821	1,085,068	660,301	424,76
	10 " " '09	2,282,987	1,166,937	1,116,050	643,218	472,73
ST. JOSEPH, MO. St. Joseph Ry., Lt., Ht. & Pwr. Co.	1m., Oct. '10	87,613	44,446	43,167	23,297	19,87
	1 " " '09	82,362	43,167	39,195	21,521	17,67
	10 " " '10	854,363	458,896	395,467	227,056	168,41
	10 " " '09	805,170	417,697	387,473	213,602	162,95
SAVANNAH, GA. Savannah Elec. Co.	1m., Oct '10	53,795	35,518	18,277	18,220	5
	1 " " '09	50,618	32,973	17,646	17,621	2
	12 " " '10	623,355	407,071	216,285	215,251	16,03
	12 " " '09	611,387	394,081	217,306	209,181	1,12
SEATTLE, WASH. Seattle Elec. Co.	1m., Oct. '10	469,033	239,639	229,393	109,914	119,48
	1 " " '09	544,077	326,201	217,877	102,169	115,70
	12 " " '10	5,558,439	3,249,493	2,308,946	1,301,744	1,007,20
	12 " " '09	5,734,623	3,330,894	2,403,729	1,225,881	1,177,84
SYDNEY, C. B. Cape Breton Elec Co., Ltd.	1m., Oct. '10	30,496	13,447	17,049	6,160	10,88
	1 " " '09	27,253	14,047	13,206	6,199	7,00
	12 " " '10	320,975	170,322	150,654	73,933	76,72
	12 " " '09	281,104	167,332	113,772	74,195	39,57
TACOMA, WASH. Puget Sound Elec. Ry.	1m., Oct. '10	161,760	101,079	60,681	50,018	10,66
	1 " " '09	170 199	110,590	59,609	49,777	9,83
	12 " " '10	1,895,045	1,248,589	646,456	606,323	40,13
	12 " " '09	1,850,012	1,227,270	622,741	458,792	63,94
TAMPA, FLA. Tampa Elec. Co.	1m., Oct. '10	43,254	23,998	19,256	6,130	13,12
	1 " " '09	50,759	26,792	23,968	4,624	19,34
	12 " " '10	611,750	339,846	271,904	61,584	210,32
	12 " " '09	586,253	349,110	237,143	56,182	180,96

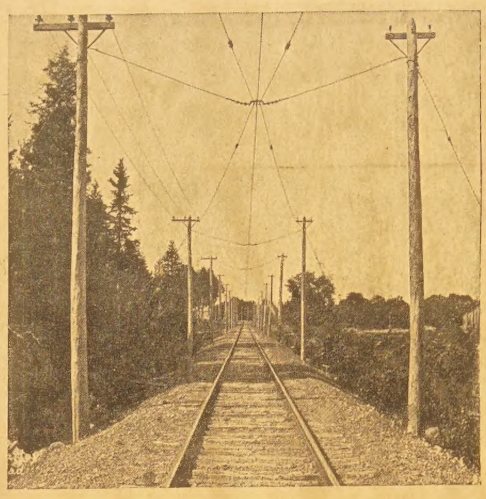


THERE is doubtless a general tendency in the direction of steel underframes and for many types of cars they obtain the best results, though for others a composite or semi-steel underframe is adequate. The continual shocks and strains to which every car is subjected cause little damage when the underframe is of steel and, to meet the steadily increasing demand, we have developed the art of steel construction to an advanced stage and have secured maximum strength with minimum weight. Although the frame in the above illustration is for city cars we have furnished a large number of various types for inter-urban and baggage cars. Our shops are specially equipped for this kind of work and we also build all types of all-steel cars. Let us figure on the equipment you may be considering for next year.

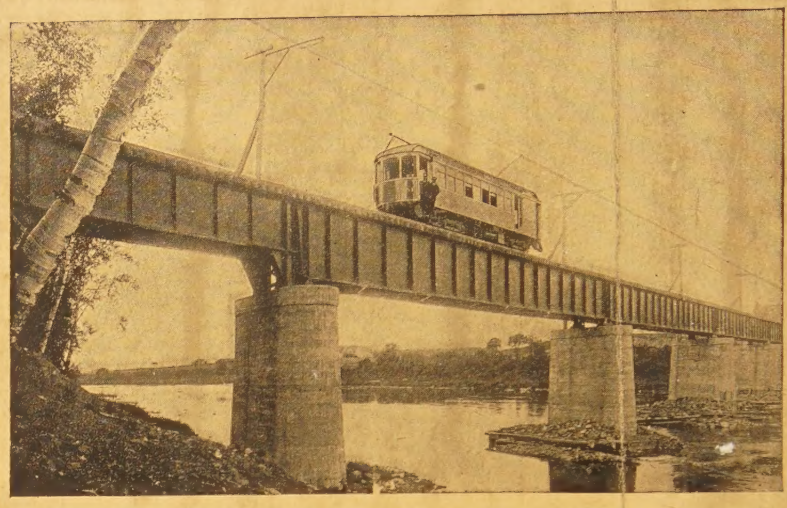
THE J. G. BRILL COMPANY, PHILADELPHIA

Pierson, Roeding & Company, *San Francisco;* Giovanni Checchetti, *Milan;* Noyes Bros., *Melbourne, Sydney, Dunedin, Brisbane, Perth;* C. Dubbelman, *Brussels;* Shewan, Tomes & Co., *Hong Kong, Canton, Shanghai;* F. H. Bagge, *Buenos Aires;* International Machy. & Eng. Co., *Mexico, D. F.;* Thomas Barlow & Sons, *Durban.*

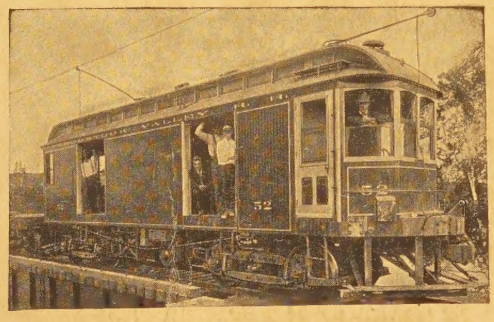
BRILL



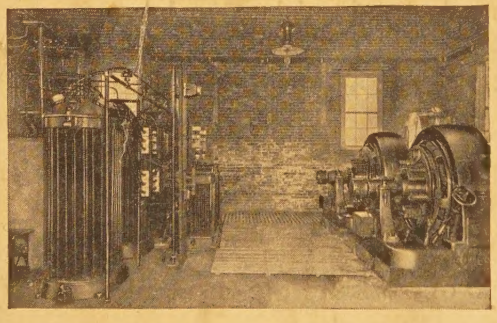
Straight Line Trolley Anchor, Span Construction. Practically as simple as ordinary 600 volt construction and just as safe.



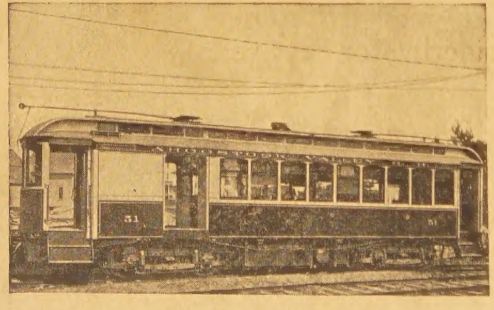
Car on bridge over the Aroostook River, Aroostook Valley R. R.



Thirty-three Ton Box Car Locomotive, equipped with four 75 h.p. motors. This locomotive proved very efficient during construction of the road.



Munson Hill Sub-station. Two 60 cycle rotary converters in series are giving perfect satisfaction.



Combination Passenger and Baggage Car. A weight, complete with passengers, of only 28 tons means correspondingly low operating expenses.

Mr. A. R. Gould, President of the Aroostook Valley Railroad Company highly endorses the 1200 Volt Railway System

Another railroad has put itself on record as being entirely satisfied with the performance of 1200 volt equipment. Read what President Gould of the Aroostook Valley Railroad, which hauls both passengers and freight between Presque Isle and Washburn, Maine, recently wrote:

AROOSTOOK VALLEY RAILROAD CO.

Mr. C. E. Eveleth, Presque Isle, Maine, Oct. 28, 1910.
Railway & Traction Dept.
General Electric Company,
Schenectady, N. Y.

Dear Sir:

In answer to your recent inquiry asking about the operation of the 1200 volt equipments on our road, beg to advise that the performance of the electrical apparatus for passenger cars, locomotive and substation has been entirely satisfactory. The 60 cycle 600–1200 volt rotary converters have given us no trouble at any time, while the working capacity of our locomotive with four 75 h.p. motors has proven greater than we had expected.

In fact, we believe that our power consumption and operating costs are materially less than they would be with 600 volt system, while we have as yet found no offsetting difficulties resulting from the adoption of the higher potential.

The writer has not had much railroad experience, but we have in our employ some old hands who have had to do with the operation of 600 volt railroads and they unhesitatingly say that the 1200 volt system is far superior in many ways to anything they have ever seen.

Yours truly,
Aroostook Valley Railroad Co.
ARG/T (Signed) A. R. Gould, Pres.

Proven Advantages for Interurban Service

The 1200 volt D.C. System has met with unqualified success because it is a rational development of standard equipment, now used on 600 volt roads. It makes use of standard generators, rotary converters, railway motors and control, insulated for the increased potential. The same degree of reliability of operation has been secured as in ordinary city service.

In both construction and operating costs, the 1200 volt system has shown a marked reduction over the 600 volt system. As far as comparative figures can be secured, no other system for the average interurban railway has yet been perfected which can show as large returns on the investment.

1200 volt operation now embraces 16 roads, 575 miles of track, 246 cars.

General Electric Company

Largest Electrical Manufacturer in the World

Principal Office: Schenectady, N. Y.

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